COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER

At Info '77 in New York

Users looked

And touched . . .

While in Seattle, ACMers gathered, honoring John Backus. Coverage begins on Page 8.

SRI Faults Management

DP Auditing Found in Poor Shape

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Audit and control procedures have not kept up with new technology and concepts in computer and communications systems design, according to a study conducted by SRI International for the Institute of Internal Auditors that was presented here last week.

Funded by IBM, the study concluded that the top executives of most organizations have abdicated their responsibility to provide resources and direction to internal auditing staffs assigned to minimize losses resulting from computer system errors, omissions and fraud.

SRI mailed a questionnaire to 1,500 large DP users, organizations that spend more than $1 million/year on hardware rental.

Item: Of the 39.7% who answered the questionnaire, mailed to three levels of management at the institutions, 38% had no audit procedures for their computers.

Forty-two percent had a DP audit function, but only one organization in five had performed audits of its computer operation before 1970.

Item: 55% of the top management respondents to SRI's questions believed their internal audit departments were involved in the presystem design and implementation stage of their computer operations. Only 5% of the internal audit departments agreed with this perception.

Item: Only 17% of these large users had internal loss-reporting systems to keep top management up-to-date.

Item: SRI was only able to identify 28 audit tools and techniques used by these organizations to examine their DP operations. Of the four most commonly used tools — audit software, tracing and mapping, test decks and parallel simulation — not one of these was used in as many as one-third of the organizations surveyed.

Item: 50% of the large users provide

(Continued on Page 6)

From Planning to Printouts, Package Manages IBM Sites

By Don Leavitt
CW Staff

CHICAGO — A user that wanted to make its large-scale IBM installation run more automatically developed a package designed to do just that — and the package is now commercially available.

Developed by Kraft, Inc., headquartered near here, and generalized for use by Software Systems Corp. (SSC) of Virginia, Dimension V is, in the words of SSC, a "performance manager" because it combines and coordinates facilities previously provided by a number of separate packages when they were provided at all.

The package supports planning activities, control and adjustment of the workload during execution; follow-up tracking to respond to user queries about job status; and analysis and education related to problems in order to prevent their repetition.

At Kraft, one version of the system is used to run a center that includes an IBM 370/168 and a pair of 158s. Kraft reported "3% to 4%" overhead from use of the system, but noted that with it and several complementary packages, the operations staff has dropped from about 120 to about 60, even though the workload has increased

The package is essentially an automated scheduler taking into account user-defined resources related to the data center, dependency networks of the work to be done and constraints in terms of the earliest time at which it can be started and the latest time by which it must be completed.

Since Dimension V allows the user to define resources — in the data center in general and in the computer — even before they are in place, the package provides a means of simulating the effect of changes before they are really made, SSC said.

Its primary function, however, is the scheduling and monitoring of actual work as it goes through the center. The resources can include everything from the delivery service to the detailed configuration of as many as eight computer systems, according to an SSC spokesman

Dimension V can work with JCL libraries cataloged on disk in partitioned data sets or under Pansophic's Panvalet — with adaptation to other library systems seen as minor difficulties at worst. The stored JCL streams can be modified from the operator's CRT right up to the time the job goes under OS control, the spokesman said.

(Continued on Page 6)

Burroughs Gets Early Cue And B6817 Makes Entrance

By Jeffry Beeler
And Frank Vaughan
CW Staff

DETROIT — IBM's introduction of the Model 3031 has prompted yet another mainframer to announce a large-scale computer system ahead of schedule.

The latest offering is the Burroughs Corp. B6817, a multiprocessor-based addition to the B6800 series.

Priced in the same range as the 3031, the B6817 provides 50% greater throughput than Burroughs' B6811 and three times more computing power than its entry-level B6803, according to a spokesman.

A dual-processor version of the B6807, the B6817 is object code-compatible with all B6000 and B7000 systems and accommodates interactive APL, Cobol, Algol, Fortran, PL/I and Basic, the company said.

With Burroughs' Data Management System (DMS-II), Network Definition Language and Message Control System software products, the system will allow users to implement transaction-oriented data management systems

(Continued on Page 4)

Lease Insurance Suspended

By Ronald A. Frank
CW Staff

NEW YORK — The introduction of IBM's 3031 and 3032 processors has resulted in the cancellation of some third-party lease insurance covering the 370/148, 158 and 168.

Most insurance covering third-party leases for the 370s is written by Lloyds of London. After the 3031 and 3032 were announced [CW, Oct. 10], the British underwriter notified its policyholders it is temporarily suspending its coverage on new 370 leases until it has a chance to evaluate the current status of the market.

Lloyds issues the policies to third-party leasing companies which in turn provide users with an escape clause on typical seven-year operating leases. The escape clause allows a user to back out of a lease agreement after three or four years if a later or better machine has become available.

In this situation, the insurance pays the amount due on the lease if the 370 cannot be marketed elsewhere.

According to a source within the U.S. insurance industry here, the notice to

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On Capitol Hill

Transborder Data Taking Back Seat

By Edith Holmes
CW Staff

WASHINGTON D.C. — Maintaining the free flow of information across national borders has taken the rumble seat to the passage of energy legislation, the ratification of the Panama Canal treaties and resolution of problems in the Middle East as far as Congress is concerned.

Few people — on and off Capitol Hill — are even aware of the wide range of privacy, economic and national sovereignty issues surrounding possible restrictions on the international movement of data, one congressional aide said following a House Communication Subcommittee hearing held here recently to acquaint members of Congress with the subject.

"Transborder data flow could be of interest to some people," the aide agreed, "but it certainly isn't yet of the magnitude of the Salt [Stategic Arms Limitations Talks] negotiations. There is considerable question that it ever will an important issue area for the U.S." he added, acknowledging that he did not know much about the international flow of information.

White House Action

Meanwhile, the White House has expressed its concern for the U.S. policy void regarding transborder data flow by helping to form an interagency task force on the subject to be run by the State Department under the rules and procedures of the National Security Council (NSC), according to Christine Dodson, NSC staff secretary. The task force will hold its initial meeting this week — on Oct. 26 — to decide how it will proceed.

Ultimately, the interagency task force will present the results of its study to the executive branch which will, in turn, decide whether U.S. policy in this area is warranted, Dodson explained. All of this could take considerable time, a White House aide said.

One of the more knowledgeable members of Congress in this field, Rep Barry M. Goldwater Jr. (R-Calif.), plans to encourage the interagency task force in its efforts.

Commenting on the lack of congressional and public interest in the international flow of data, Goldwater suggested that "at the moment, the issue looks terribly exotic — almost of a Buck Rodgers quality."

An author of the Privacy Act of 1974, the congressman is particularly concerned that the privacy issue might become "a Trojan horse" for the political and business interests of European, Far East and third world nations.

Shutting Out Business?

Protective privacy legislation has been passed or has been proposed in several countries, and along with others, Goldwater fears the trend toward keeping data at home really equates with shutting U.S. business interests out of foreign countries.

The U.S. has an obligation to be involved in the transborder data flow issues, based on the merits of privacy itself from an economic viewpoint, he said. He hopes for a "commonality of privacy status between nations."

Goldwater is not alone in his interest in this field. During the panel discussion of transborder data flow before the House Communications Subcommittee, Rep. Louis Frey Jr. (R-Fla.) pressed business and government representatives at the hearing for a report on how well the U.S. presented its position at the Organization for Economic Cooperation and Development (OECD) conference in Vienna last month.

At that meeting, U.S. representatives expressed strong feelings about the importance of moving slowly on any form of international agreement that could restrict data flow. They seemed to have persuaded some conferees to adopt their view [CW, Oct. 3].

However, at another meeting only one week later, the Council of Europe's Subcommittee on Legal Affairs, acknowledging its mandate to adopt some type of international transborder data/privacy convenant, agreed to continue to refine a draft agreement already under consideration — with or without American participation [CW, Oct. 10].

The lack of a national policy on the international movement of information "is as much the Congress' " fault as anybody's, Frey said at the hearings. "Aren't you in trouble?" he asked panel participants from Systems Development Corp., Scientific Time Sharing Corp., General Electric Co. and Control Data Corp.

"The government is abolutely not representing U.S. interests in this matter," one panel member responded. "We alone are not fully aware that we are at economic war with the rest of the world. We will do our nation a disservice if we don't elevate this discussion," he maintained.

House Communications Subcommittee chairman Rep. Lionel Van Deerlin (D-Calif.) has expressed interest in the issue, but he is described by a staff member as "swamped" with the revision of the Communications Act of 1934.

Foreign relations specialists for Senators George McGovern (D-S.D.) and Charles Percy (R-Ill.) are currently on a European trip to discuss international communications issues with representatives of a number of nations. These aides plan to talk with OECD members and others to try and assess European feeling concerning transborder data flow, one of the specialists said.

Another Senate aide confirmed that there is a joint resolution on the subject of international data movement in the works, but added that the resolution is far from ready and certainly won't be out before Congress adjourns this year.

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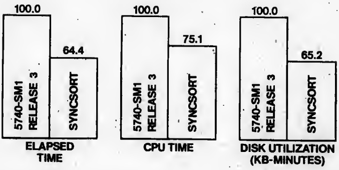
Our friends who put out the *EDP Industry Report* — the "Gray Sheet" — assessed the importance of the new 138s and 148s as follows:

> "Perhaps the biggest single development of 1976 was IBM's introduction of two new 370s . . . and new price/performance curves to go with them . . ."

We couldn't agree more. The new "eights" really do yield more "bang for the buck" as the Gray Sheet puts it.

But we'd like to add a footnote to that: The bang will be considerably louder if you sort with SyncSort rather than IBM's 5740-SM1, Release 3. (*It* must have been made by a *different* bunch of elves.)

If you'd care to prove that for yourself, just try a couple of benchmarks comparing the two sorts on exactly the same files. You'll see a picture of resource usage that looks like this:



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No Telex Traffic, Packet Nets Say

By Ronald A. Frank
CW Staff

ATLANTA — Telex messages will not be allowed on the emerging public packet networks, according to statements made by foreign carrier representatives at a recent conference here.

Diversion of traffic from the Telex network to the new services must be done "in a controlled manner" so existing service will not be affected adversely, George Orchard of the British Post Office told attendees at the International Telecommunications Exposition (Intelcom 77).

Jean Picard of the French postal, telephone and telegraph (PTT) authority said future Transpac packet net CPUs will receive messages from a Telex terminal or users will be able to dial from a Transpac host into Telex, but terminal-to-terminal Telex traffic will not be possible using Transpac facilities.

International Messages

Asked whether Telex terminals would be able to transmit international messages, Picard said they would as long as the message were being sent from a Telex terminal to a host CPU.

Picard admitted the restriction against terminal-to-terminal traffic is a short-term position of the PTT and in the long run all types of terminals should be able to talk to each other.

Maurizio Decina of the Italian telecommunications administration agreed that Telex messages will have to remain on the Telex network initially. In the longer term, however, the user will have to be concerned only about the performance characteristics of a network and will be able to interface all types of devices with each other.

Turchin Gets Nod to Leave

LENINGRAD, USSR — Dr. Valentin Turchin, a computer scientist in disfavor with Soviet officials since 1973, has been granted permission to leave the Soviet Union and immigrate to the West.

Turchin headed a laboratory at the Institute for Automated systems until he was reportedly dismissed after protests over government treatment of Soviet dissidents [CW, Aug. 13, 1975].

Harrassed by the KGB and blacklisted from working in his professional field, Turchin came to believe his only real alternative was to leave the Soviet Union, sources said.

His case received widespread publicity, especially within the computer industry, and such groups as the Association for Computing Machinery and the Committee of Concerned Scientists, as well as individuals, wrote letters of protest to the Soviet government [CW, Dec. 10, 1975].

However, their efforts accomplished nothing until very recently, when pressure increased as a result of Turchin's protests over the much publicized case of dissident Anatole Sharansky [CW, Aug. 22].

Although it is difficult for outsiders to determine any clear reason for Turchin's final release, his "resoluteness," combined with pressure exerted from without, probably expedited the permission to immigrate, according to Mark Mellman, executive director of the Committee of Concerned Scientists.

Turchin, who is reportedly en route to the US. with his wife and two sons, will accept an invitation to teach at Columbia.

Lloyds Suspends Lease Insurance on 370s

(Continued from Page 1)

lessors was issued so the underwriter can get an accurate perspective of the market for large 370s. Lessors with insurance policies were asked to provide the underwriter with a description of their current portfolios as part of this evaluation, the spokesman said.

"The question is how much the 148s, 158s, and 168s have been impacted by the 3031 and 3032," he added.

The Lloyds notice did not specifically prohibit policyholders from negotiating new leases if they are willing to comply with any restrictions that Lloyds may require after the current moratorium has ended. In practice, the lessors will probably wait to see what those resrictions will be before proceeding, according to another industry source, who said that may be why some lessors have not been returning calls from customers.

Lloyds began to insure third-party computer lease plans in late 1974. It has placed a similar embargo on new leases several times since then.

The last time was in June 1976, after the IBM 370/138 and 148 introductions. When that moratorium was lifted two months later, Lloyds required lessors to underwrite 20% of the value of the insurance policies with their own funds.

Although experts believe the current embargo will last only several weeks, none is willing to predict what new restrictions Lloyds will place on the 370 leases.

Three Options

Three options apparently are available to the British underwriter: continue the policies as before; set up new restrictions; abandon the 370 lease market entirely.

Most experts believe the last alternative is a slim possibility since the larger 370s still have an estimated useful life of at least two years for leasing purposes.

Companies believed to be affected by the Lloyds notice are Itel Corp., DPF, Decimus, Alanthus, LFC, and National Computer Rentals, according to industry sources. Lloyds has written about 20 policies for firms in the computer leasing businss, sources said.

One firm that was not affected by the Lloyds action is Computer Finders, Inc. of Hackensack, N.J. According to Tom Martin, president, the company has three money sources that are continuing to write leases on the 370s, although the leases may be written at slightly higher rates than ones previously written by the firms which have Lloyds insurance policies.

Small Portion Affected

One industry source said only a small portion of the 370 leases that were being written was affected by the Lloyds insurance and that longer term leases did not use the Lloyds coverage.

The exact effect of the Lloyds notice was a subject most lessors refused to discuss. Once source admitted potential customers who know a lessor is in a difficult position might be able to negotiate a better lease.

Leasing companies that were contacted refused to comment on the situation. A spokesman for one such firm said, "We have completed our 370 program, but in any case we would not want to discuss any of our lease insurance arrangements."

Correction

In a story concerning the Council of Europe's move toward a data protection accord, [CW, Oct. 10], the Council of Europe was incorrectly referred to as the European Economic Community (EEC) in both the headlines and the first paragraph. EEC countries are members of the Council of Europe, but the council also has about 10 other member nations that are not EEC members.

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WANG

Burroughs Debuts B6817 With 3031-Range Price Tag

(Continued from Page 1)

and on-line communications networks, the spokesman added.

A Master Control Program (MCP) manages all B6817 hardware and software resources, according to the spokesman, who noted the system can be configured with the recently announced Attached Fortran Processor.

The B6817 uses two levels of directly addressable memory — Global and main. Global memory, which primarily serves applications like master scheduling, allows the system's CPUs to operate in a multiprocessor or a shared-resources mode.

In the multiprocessor mode, the MCP manages all the system's resources and allocates them as needed to the various jobs being processed, the spokesman explained.

In the shared-resources mode, each system manages its own job streams and resources. This arrangement allows the CPUs to operate independently, communicate with each other and share common data bases, the Burroughs official noted.

A basic B6817 system consists of two CPUs operating at 6.67 MHz, two I/O processors with a minimum of 20 channels each, two maintenance processors and displays and two operator consoles with dual displays.

Users can expand the system to accommodate up to four CPUs, four I/O processors and 16 data communications processors serving 4,096 lines, the company said.

A typical configuration holds 2.2 million bytes of memory, but the B6817 can operate with as little as 786K bytes of main memory and 786K bytes of Global memory, expandable in 393K-byte and 786K-byte increments, respectively, to a totoal of nine million bytes, the firm said.

With additional processors, the system's total directly addressable memory capacity can expand still further to 15,360K bytes. Both main and Global memory access is 325 nsec at the bus level, the spokesman said.

An entry-level B6817 with 2.2 million bytes of memory sells for $975,000 or leases for $27,225/mo on a one-year contract that includes around-the-clock maintenance. Additional Global and main memory cost $72,000 per increment or $2,300/mo on a one-year contract, while the price of additional processors is $34,800 or $970/mo. Burroughs is headquarterd at Burroughs Place, Detroit, Mich. 48232.

GAO Hits Conversion Procedures

U.S. Wasting $100 Million/Year on Software

By Molly Upton
CW Staff

WASHINGTON, D.C. — The federal government could save about $100 million a year if agencies making hardware changes improved their software conversion procedures, according to the General Accounting Office (GAO).

The agencies do not even consider conversion costs when they award contracts for new computing equipment, the GAO told congress in a report entitled "Millions in Savings Possible in Converting Programs From One Computer to Another."

The report suggested one way to recoup some of that $100 million might be to establish a federal center for software conversion.

Conversions from one machine to another, including upgrades, cost the government more than $450 million annually, the GAO learned from a questionnaire answered by 2,470 government programmers and supervisors. The $100 million and $450 million figures were extrapolated from the $6 billion the government annually spends on software. Of that $6 million, $3 billion goes for maintaining and converting programs.

The GAO estimate of $450 million for software costs consists of $25 million for conversion of programs acquired from outside sources and over $425 million for software conversion costs incurred when agencies replace one system with another.

Derivation of Figures

The GAO derived the $425 million figure by taking one-seventh of the $3 billion annual expenditure for maintaining and converting programs because it considers seven years the typical life span of a hardware system. It also took one year as the typical time for conversion of an installation.

The $25 million for outside program conversion was derived from programmers' estimates of the percentage of their time they spend converting outside programs as well as the cost to the General Services Administration (GSA) of a software staff-year.

Although government programmers and supervisors estimated about 40% of costs could be saved, the GAO took the more conservative 24% figure offered by independent experts and thus arrived at the over $100 million figure.

Included in the costs of conversion were delays in user tasks, labor, retraining, interference with other uses of the computer, morale and documentation.

The survey also revealed that programming incorporating the features unique to a particular machine contributed significantly to the cost of conversion later.

The suggested federal center for software conversion would be established with assistance from the Office of Management and Budget.

The GSA could participate by being authorized to require the center to provide independent conversion estimates for expensive agency procurements that have significant conversion costs, the report suggested.

The center should provide services such as impartial estimates of the conversion implications of system procurement alternatives; some capability to actually perform conversions; and a mechanism for transfer of lessons learned to future software conversions, development and procurements, the report said.

Having conversion expertise reside in one place would be helpful since an installation normally converts every five or 10 years. These installations generally do not have many people who either know conversion techniques or recall how it was done the last time.

In addition, the center could also assist agencies in converting programs collected by GSA's recently established Federal Software Exchange Center, the report observed.

The U.S. Navy and the GSA are currently developing plans to establish such a conversion center, the report noted, adding this is a step in the right direction.

Quality Important

More emphasis on quality in the original development of software and documentation would ease eventual conversion problems, according to the report.

Furthermore, the possible greater cost would be more than offset by easier conversion and modification, fewer errors in the supported user tasks and more feasibility of sharing the software among multiple users, the report indicated.

Regarding standardization of languages among manufacturers, the GAO indicated management should require that use of vendor-unique features be justified by savings in operating costs.

Another means of restricting the use of vendor-unique features would be to require vendors to sell to the government programming language compilers that include only the standard language, the report said.

The report also recommended that the National Bureau of Standards (NBS) select and publish a set of programmer productivity aids.

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ACMers Young and Loyal

By Don Leavitt
CW Staff

SEATTLE — The Association for Computing Machinery (ACM) is a youthful organization: 75% of its membership is 40 years old or younger, according to survey results published in the current *Communications of the ACM* and distributed in reprint form at the annual conference here last week.

The membership is loyal, too, the study begun two years ago found. Sixty-five percent of the members responding to a questionnaire belong only to ACM.

Fifteen percent also belong to the IEEE Computer Society, but no other outside group attracted as much as 3% of the ACM membership, according to Thomas A. D'Auria, chairman of the membership committee and author of the report.

The association's reputation as a "home" for academic and scientifically oriented people was confirmed by the survey, which garnered some 18,200 responses from the approximately 30,000 members. Thirty percent of them "have employers in the education field" and more than 55% are in the scientific, systems and research area, D'Auria wrote.

Only 16.7% are commercial users of computer systems, he added.

ACM members have a high education level, according to the membership chairman. Nineteen percent have doctorates and 37% have master's degrees.

Of those with degrees — including bachelor's — 29% majored in computer science, 24.5% in math and 11.5% in electrical engineering.

Only 5.6% have degrees in business-related disciplines, D'Auria noted.

The members' top two areas of major technical interest are software systems design/programming/implementation (22.4%) and data structures/data base management/data retrieval (12.6%), the report showed.

Higher level languages, applications and operating systems — the next three interest areas — all fell in the 8% to 9% range, according to the survey.

When comparing job title for function with purchasing authority, the high buying power of ACM members is apparent, according to D'Auria. Forty-five percent of the respondents said they are senior professionals.

These figures are "especially interesting," the report continued, when considering the fact that 63.9% of the respondents purchase or recommend purchase of at least one type of computer equipment or service.

Package Developed by User Manages Large IBM Sites

(Continued from Page 1)

In the event of an inquiry or a problem, the operator can call for a display of job status and, if needed, make adjustments to cope with new situations. Jobs can be reassigned from one CPU to another, for example, if one goes down.

Job-by-Job Basis

The reassignments are made on a job-by-job basis, SSC pointed out, so critical work can be handled immediately and other jobs delayed if a hardware failure disrupts normal schedules.

Although the spokesman indicated a global reassignment facility might be included in a later version of Dimension V, he noted that would be inappropriate for the package's normal purpose.

The job status reports indicate not only work still to be done, but work done during the current scheduling period. Thus a job run in the morning would still be shown in the afternoon and the operator could determine then if and when printing of the output was completed.

Since workload schedules vary from time to time to handle holidays and special requirements — quarterly and other periodic reports, for example — Dimension V was designed to support selection from among multiple, predefined calendars. Each calendar can include unique dependencies and start/-deadline times even if the jobs involved appear to be unchanged, SSC said.

Batch Version Available

Available now in a batch version, Dimension V will also have an on-line implementation before the end of the year, according to the vendor. Since the product incorporates most of the capabilities of both Deadline and Streamline, SSC's previous scheduling packages, there will be no further development work on them.

They are "functionally stabilized," although user support and error correction work will continue "especially for those with current maintenance agreements," the spokesman said.

Dimension V functions under any OS environment, he added, and the batch version is available to current SSC clients for $4,200 plus $1,000 for on-site installation and training. SSC clients without maintenance agreements will be charged an additional $2,500.

For new users, Dimension V-Batch costs $35,000 while the on-line version will cost $60,000, SSC noted from Suite 410, 7900 Westpark Drive, McLean, Va. 22101.

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Data security problems have existed ever since the advent of major computer centers accessed remotely via dial-up or dedicated lines. They're even more critical now with Electronic Funds Transfer becoming a reality with millions of dollars on the line.

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DP Auditing in Bad Shape, Managers Hit for Failure

(Continued from Page 1)

no training or professional development for their DP auditors whatsoever. An additional 45% spend less than 5% of their internal audit budgets on training. SRI found that only one organization in 20 considered auditing important enough to spend $1 in $20 on training auditors.

No Longer Impregnable

SRI's three-volume report entitled "Systems Auditability and Control" maintains that it is no longer possible to build a fortress around the computer system to prevent losses.

Communications capability automatically makes the fort a leaky bastion. The time has come for DP auditors to audit the black boxes as well as the environments around them, SRI contended.

Seven man-years of effort and $1 million convinced SRI that there has been a "clear failure on the part of the EDP audit field to keep pace with the management information systems environment."

SRI's survey of large-scale system users in the private sector and in government indicated management generally operates under "gross misconceptions" of the auditing function in its company.

Too busy, believing that auditing is dull and uninteresting, top management has not accepted the fact that the responsibility for overall internal audit control belongs in the head office.

Internal audit must involve itself to a greater extent in DP audit use and design. The internal audit function can do so without losing the independence needed to make an examination of the system, SRI maintained.

Further, the only way an organization can effectively minimize its losses is to regularly and carefully assess the DP audit controls it has in place, SRI noted.

Twenty-eight audit tools simply aren't enough, given the number of systems in a large organization, the number of languages that can be used to program those systems, the number of applications they handle and the number of people who will use the system. Multiply all these factors together and 28 seems a very small number, SRI's Joe Hootman said in presenting the report.

Finally, the quantity and expertise of DP audit personnel needs to be increased, he said. Training should emphasize the real world and include plenty of workshop experience.

Top management sets the tone for the entire organization. In the interest of minimizing "financial surprises" and increasing efficiency, this level of the organization needs to recognize the importance of the internal audit and DP audit functions.

The organization's leaders need to clearly define the roles of users, internal auditors and DP auditors, articulate a "comprehensive internal audit mandate" and require control guidelines and standards so that the people directly responsible for auditing can get their jobs done, SRI said.

Finally, top management needs to support innovation — through new audit procedures and new control techniques — to ensure system reliability.

No Action on DP Crime Bill This Year

Washington Update

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Congress' first attempt to make misuse of computer systems a crime probably won't receive any further attention from the legislature until next year.

Stalled in the Senate Judiciary Committee's Subcommittee on Criminal Laws and Procedures is a bill that would make abuse of systems operated by the federal government, certain financial institutions and firms engaged in interstate commerce an offense punishable by a jail term of up to 15 years and/or fines of up to $50,000.

S. 1766, introduced by Sen. Abraham Ribicoff (D-Conn.) this summer [CW, July 4], will be reintroduced in the Senate at the beginning of the next session of the 95th Congress, a spokesman for the committee said.

House Fails in Try To Halt Revamp Plan

President Carter's "Reorganization Plan No. 1" went into effect last week following the defeat of a House resolution to disapprove it and a favorable Senate response to the changes the plan will make.

Among those changes are the distribution of the Office of Telecommunications Policy's (OTP) functions among the White House, the Office of Management and Budget (OMB) and the Commerce Department [CW, Aug. 15].

The House Government Operations Committee, headed by Rep. Jack Brooks (D-Texas), recommended Congress approve the reorganization plan, but added to its report some critical words about the confusion which the redelegation of OTP functions could foster.

Congressional complaints led the President's reorganization team to amend the plan for OTP to place all policymaking functions with the President for reassignment within the executive office. The original plan split the policy responsibilities between Commerce and Carter, causing members of Congress to fear "serious duplication and overlap."

Missing 'Information' Gives Rise to Rumors

Commerce Secretary Juanita Kreps has recommended to President Carter that Henry Geller, a fellow at the Aspen Institute, be nominated to the new post of Assistant Secretary for Communications and Information.

Former counsel of the Federal Communications Commission (FCC), Geller has yet to be nominated by the President. He must then be confirmed by the Senate before assuming the Commerce Job, which combines the department's Office of Telecommunications (OT) with the staff and many of the functions of the soon-to-be-dissolved White House Office of Telecommunications Policy (OTP) [CW, Sept. 26].

In the press release announcing Kreps' decision in favor of Geller, the Commerce Department called the position for which he has been recommended "Assistant Secretary for Telecommunications," giving rise to rumors that the information policy functions will be dropped from the job.

Sources in Congress, the Office of Management and Budget (OMB) — who are writing the executive order defining the new Assistant Secretary's job — and in the Commerce Department itself deny these rumors. Carter ordered the creation of a position for an Assistant Secretary for Communications and Information in his federal reorganization plan, so that title will remain, they said.

Why the Commerce Department release used the word "telecommunications" and omitted "information" in the title remains a mystery. One explanation is that the public affairs office in Commerce, which is called "Communications," feared public confusion over this new post.

DP Policy Not Part Of Revamp Parcel

The Carter Administration's look at federal DP won't result in the creation of a national information policy, Congress learned from the Office of Management and Budget (OMB) last week.

The federal DP reorganization study [CW, Oct. 10] will focus on "the use of a technical resource," Wayne G. Granquist, associate director for management and regulatory policy at OMB, told the House Administration Committee's Policy Group on Information and Computers.

At the same time, Granquist hinted that OMB and the executive office are talking about a project that would involve the formation of a U.S. information policy. He promised Rep. Charles Rose (D-N.C.), the policy group's chairman, that OMB will "be able to say more about this" in two to three weeks.

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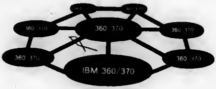

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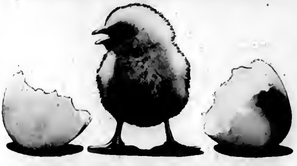

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CW at Info '77

DP Departments Urged To Tell — Not Ask — Users What They Need

By Molly Upton
CW Staff

NEW YORK — DP managers should stop asking corporate users what they want. Instead, DPers should tell them what they need to achieve corporate goals, according to Joseph J. Carr, vice-president of information systems and services at American Can Co.

The DP manager must be able to demonsrate that he knows as much about the user's particular business and problems as the user does, Carr told a session at the Information Management Exposition & Conference (Info '77) here last week.

Carr likened the position and authority of information systems and services at American Can to that of research and development, noting that managers are accustomed to working through R&D for specific projects. Now managers have to have approval for projects and systems from the DP department, he said.

A key element in the department's position is knowledge of corporate ground rules and long-term goals, he stated. With these, Carr's department can ensure that what an operating unit gets is consistent with corporate policy and objectives, he said.

Matrix Management

American Can has adopted a matrix management structure for its 20 business units; each manager of a business unit has full responsibility. However, American Can also has corporate resource functions such as personnel and R&D, Carr explained.

As VP of data processing, Carr reports on a par with managers of business planning and business control to the senior vice-president of operations control, he said, adding he is thus in a position to participate in planning. He is also on the corporate policy board, a subset of the management executive board.

Carr's department assumes an active initiator role because a business unit might not know what's right for it, he said. Also, many managers don't see the implications of what they want to do, "so we direct rather than respond," he added.

One reason Carr's department can maintain its position of authority is that it has undergone a major upgrade in the business quality of its people, he said. The DP department recruited line managers with systems experience; given the right technical support, they can communicate with business, he said.

Another important element in planning is merging business planning and systems cycles, Carr said. No business plan is complete without an accompanying system plan, he added.

Carr has four groups within his department that are on equal footing when planning is considered — systems development, information management, facilities management and operational control.

As part of the transition to the new management structure at American Can, the firm set up an interim systems plan.

The DP department looked at projects that were in the hopper and either killed or approved them. It took 50 projects and merged 40 of them into eight areas of major thrust.

It also gained a better balance of long- vs. short-term projects, which allowed establishment of broad targets, such as spending 70% of systems dollars on upgrades or new developments.

Projects that were good for an individual operating unit but inconsistent with overall corporate direction were either eliminated or deferred, Carr said.

Directional Plan

The directional plan should provide a framework to get strategic information direction consistent with long-term corporate goals, Carr said.

A key element of the directional plan involves management giving DP the ground rules so DP can assess where the corporation is going and analyze requirements and functional development. DP's business strategy is to demonstrate that it can provide cost reductions.

In some cases, Carr said, the DP department has gone to some other unit with ideas on how to cut costs and has shown savings from the new system will fund development for that system.

Carr's staff numbers 425. The two corporate DP centers in New Jersey and Connecticut have about five IBM 370/158s and two 145s. There are about 40 smaller systems such as Burroughs Corp. B700s and IBM System/3s in the field; major subsidiaries have stand-alone systems, usually 145s or 158s.

Atwood Elected DPMA President

WASHINGTON, D.C. — Delbert W. Atwood Jr. of the Utah State Board of Education has been elected 1978 international president of the Data Processing Management Association (DPMA).

The election of the association's international officers was held during the recent Info/Expo '77.

Atwood, systems coordinator in the DP division for the State Board of Education of Utah, will assume the duties of his office Jan. 1.

Atwood has been involved in DP for more than 21 years and has been a member of the local Great Salt Lake Chapter of DPMA since 1957. He earned the Certificate in Data Processing in 1962.

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Integration Seen Key to Managing Information

CW at Info '77

By Molly Upton
CW Staff

NEW YORK — Information management will evolve when firms can view the computer, office and telecommunications systems as components of an integrated system, according to David S. O'Dwyer, marketing manager of AT&T's strategy group.

A necessary precursor of this integrated information management is the implementation, but before integrated information management systems arrive, standards must be developed regarding input and extraction of information, O'Dwyer said.

As the scope of the overall information management process is recognized and as the communications stream becomes digital for all office solutions, vendors must broaden their product lines to address the different facets or else die out, he indicated.

O'Dwyer, addressing a technical session at the Information Management Exposition & Conference (Info '77) here last week, referred to this as "vendor blurring."

To supervise the various areas of communication, processing and media conversion, firms will need an information systems director who will have those in charge of personnel needs reporting to him so he can make the tradeoff between people and machines.

Currently, vendors addressing the paper-oriented office functions of today tend to focus on increasing the productivity of the typist or secretary, and this does not always increase the productivity of the manager, he said, noting that in order to look at the totality of information management, one would consider the different components, functions and modes that comprise the computer, office and telecommunications systems.

Such an examination will point out the overlapping functions and also the feasibility of increasing price/-performance, he said.

Because the processing element has been declining in cost more rapidly than transmission, O'Dwyer said users will utilize processing even more to trim their overall costs and processing will dominate all systems solutions at an ever increasing rate.

Furthermore, processing will encourage the integration of video with other modes, he said. Changing office procedures from the unstructured, stand-alone paper procedures of today to the highly structured solution inherent in a systems approach will take a long time and should be considered a change of an evolutionary nature, he explained.

The major evolution will occur when the secretary and the preparer have joint access to the information, he said. But with the dynamic growth in the use and improvement in facsimile equipment, users can stay with their paper and old filing systems, he pointed out. Another instrument that offers significant capacity for change is the ubiquitous telephone, he said, adding that Bell's Transaction Telephone could be a precursor to an intelligent telephone.

Transmission of characters, image and voice will ultimately be integrated into one information system, he said. As the market for this type of service is expected to become huge, O'Dwyer predicted the number of vendors should increase substantially.

Cognitive Tasks Topic of Study

BUFFALO, N.Y. — A professor here at the State University of New York is attempting to discover just how far computer programmers can go in feeding "human" traits into computers.

Dr. Nicholas Findler, aided by an $80,000 grant from the National Science Foundation, uses such games as chess and draw poker as vehicles for his experiments in machine cognition. During these experiments, humans play through a teletypewriter connected to a central computer.

The human subjects, however, do not know which players are computer programs and which are human. In this way, Findler hopes to study the thought processes involved in decision making under conditions of uncertainty and risk. This information could assist in developing computer programs in which the machine could improve the level of its performance on the basis of previous experience.

Findler described three areas involved in his studies:

1) A machine intelligence-oriented area which will study ways in which the performance of computer can be enhanced to make it more powerful.

2) A psychology-oriented approach that will establish computer models of various cognitive tasks.

3) A method for determining ways in which humans can be taught to become good decision makers.

Although such "artificial intelligence" may make the educated layman feel that computers might dehumanize society, Findler hopes to eventually save people from monotonous routine activities so they can exert more effort for creative pursuits.

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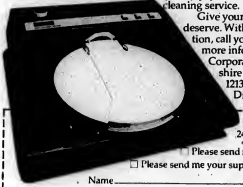

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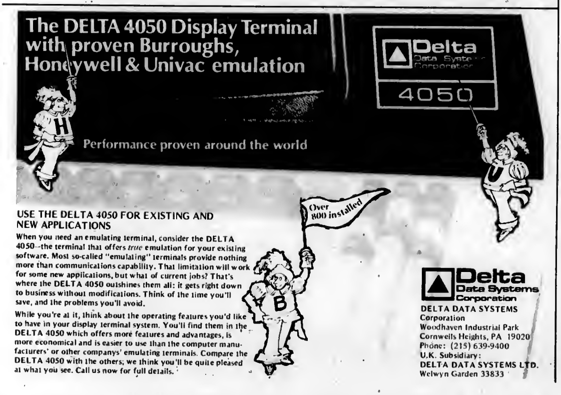

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In Evolution of Mainframes

Era of 'Polyprocessors' Viewed Near at Hand

By Ann Dooley
CW Staff

NEW YORK — Generations of large mainframes have been evolving every five to seven years, and the generation of the "polyprocessor" lies just ahead, Robert Spieker, director of Data Systems Operations for AT&T, predicted here last week.

Speaking at a session held as part of the Information Management Exposition & Conference (Info '77), Spieker attributed to generational changes the forces of technology, architecture and applications.

They interact with each other and evolution occurs when one or another changes, he explained.

Speed and reliability of computers have increased by a factor of 10 in the last five years and storage capacity has increased by a factor of 100 in that amount of time, according to Spieker.

Hardware costs have decreased by a factor of 10 in the last five years as a result of faster speeds and the reduced cost of large systems. The size, weight and power have also decreased by a factor of 10 in the last five years.

Although technology has created changes, it has also imposed constraints such as the speed of light, frequency, space, time and other irreversible components, he explained.

In order to minimize technology constraints, the size of the system can be reduced as was done in the case of a computer on a chip. Alternatives can also be selected which would include large unit processors, linked small systems or polyprocessors, he said.

The characteristics of a large unit processor include the best cost/-performance, minimizing interfaces and flexible partitioning, but also include some stability problems, resource mix constraints and large growth increments, he said.

Characteristics of a linked small processor include managability, which would make interfaces unimportant, acceptable performance and small growth increments so that a mini can be added for little cost, he said. The linked processor would also be artificially partitioned, would have high storage costs, a high cost of linking and resource constraints, Spieker said.

Major Advantages

The polyprocessor would be manageable, although not to the extent of the unit processor. It would be flexible, easily configurable and stable, and it could minimize resource constraints, have small growth increments and software partitioning, he said. According to Spieker, the polyprocessor will be the most common system.

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The design goals of a polyprocessor include reasonable flexibility, speed, stability and predictability and reasonable increments of growth and balance, he said.

The polyprocessor will have a number of CPUs, each doing its own job, according to Spieker.

Price/performance will drop significantly, he predicted, and there will be substantial differences between the main processor hardware characteristics.

Polyprocessor software structure will include a migration from software to microcode and wired logic, Spieker said. Further, there will be much more user-built microcode in 1985 designed to the user's own needs.

Other changes in structure will include value-added-layered software, distributable operating systems and self-observation and diagnosis, he added. Software will still be on tape but will also be on floppy disks and chips that are already embedded, he said.

The host processor in a distributed system would have a number of levels such as polyprocessors, unit-processors, miniprocessors and microprocessors. The computer would be at the top of the hierarchy with a remote processor, a switching processor and a front-end processor, he said. Future trends will be toward increased processor performance, greater storage capacity and functional specialization.

The lifetime of a computer between generations has been lengthening and distinctions are blurring because generations are staying on the market longer.

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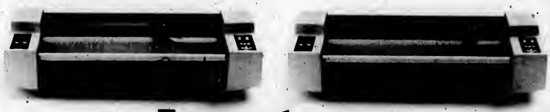

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Von Neumann Orientation Wrong

Languages in Deep Trouble: Turing Winner

By Don Leavitt
CW Staff

SEATTLE — Although a number of people feel conventional programming languages have reached maturity, John Backus, an IBM fellow at the firm's San Jose, Calif, research center, disagreed sharply with that view as he accepted the A.M. Turing Award from the Association for Computing Machinery (ACM) in convention here last week.

The soft-spoken lecturer said he feels most language work today is in deep trouble. The languages are too cumbersome, and the Department of Defense's planned 1,000-page manual on its proposed standard language is symptomatic of the problem.

Few generalized languages have really good payoffs; that's why "small, precise" languages such as Pascal are still popular, Backus said. Conventional programming languages "confuse the way we think in programs. We tackle a myriad of details instead of new ideas" to solve the particular real problem.

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The problem with current languages — including Fortran and Algol, both of which he helped develop — goes back to the initial concept of the digital computer put forth by von Neumann. The vision of a central processing unit, a main storage medium and a single connector or queue between them was an elegant idea, Backus acknowledged, but times and hardware technology have changed and languages haven't.

The CPU-storage connector is the bottleneck in the original concept. It allowed only a single word - whether data or instruction — in the conduit at any one time.

Because it was the environment in which they had to function, most conventional programming languages have been built to work through the von Neumann bottleneck, Backus explained.

Mimicking the action of the bottleneck required the introduction of variables, control statements and assignment codes. Backus noted. Structured programming techniques — when they can be applied — have been "modestly successful" in overcoming the one-change-at-a-time approach of most languages, he added.

Von Neumann-oriented languages have "enormous frameworks" of fixed, overall rules on how they can be used. The semantics are closely coupled with the state of the data, and the changeable parts of the languages typically have little expressive power, the Levi-jacketed lecturer said.

APL is not word-at-a-time oriented — "and for that we owe a debt of gratitude to Kenneth Iverson" — but even this language considers the state of the data in terms of the von Neumann bottleneck, he pointed out.

Backus has definite ideas about the types of languages he'd like to see developed and brought into general use. There should be a variable-free programming style and, closely related to that, an algebra of programming that would be comparable to high school algebra in the way it extends our vision of the concept behind any given problem, he said.

"The average programmer needs a simple way of proving program correctness," Backus commented, adding, however, that he didn't mean proving correctness in the harshly abstract way many logicians envision.

Programmers just need an assurance they're on the right track, he said. The better languages should also provide a framework for application programming, he added.

In any case, continuing development of von Neumann languages is a poor investment, the IBM Fellow said.

Calendar

Nov. 17-18, New Orleans — **Automated Procedures for Engineering Consultants, Inc. (Apec) Annual Meeting.** Contact: Doris J. Wallace, Executive Director, Apec Executive Office, Suite M-15, Grant-Deneau Tower, Dayton, Ohio 45402.

Nov. 29-30, Washington, D.C. — **1977 National Systems Forum And Exhibit,** sponsored by Transportation Data Coordinating Committee (TDCC) Contact: TDCC Headquarters, Suite 390, 1101 17th St., N.W., Washington, D.C. 20036.

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Assigning Resources Seen Prime DDP Project

By Esther Surden
CW Staff

CW at ACM '77

SEATTLE — The major challenge for a company adopting distributed processing is assigning resources with maximum effectiveness, according to George M. Crandell Jr. of McKinsey and Co., Inc. Speaking at the Association for Computing Machinery's ACM '77 in a session called Distributed Processing: A Challenge to DP Management, Crandell noted that systems' success is becoming increasingly dependent on their organizational and people aspects rather than the technical aspects.

Many problems can befall a company that goes into distributed processing without considering people and organization, he pointed out. Further, minicomputers have a way of proliferating and without a complete equipment inventory, management may not even know what systems its users have. This could increase overall DP expenditures, when distributed systems are supposed to cut costs down.

Ineffective or inconsistent application development, duplication of effort and loss of data control can also occur if responsibility is not distributed properly. In addition, computing resources may be "misused," since after the initial application is justified, the system begins to "look like a free resource and the desire to do a cost-benefit analysis goes down," he stated.

Management planning was extremely important to the success of the Missouri Pacific Railroad's implementation of a distributed system, according to Philip Seifert, manager of the minicomputer development effort for that company. Mopac's network carries 176,000 messages per day between 20 Digital Equipment Corp. minis, 63 Incoterm systems and an IBM 370/168. Another IBM 168 acts as backup, he noted.

The railroad has a plan it follows to assure smooth cutover of a new application system. As part of that plan, the distributed system is field tested to verify that the software is complete.

Next, some hands-on training and data base validation takes place. The system then runs while the implementation staff performs a comparison with the old system to assure it is ready for cutover. At the cutover stage, users take the place of the implementors.

Anticlimactic Event

If all the testing has been properly done, cutover should be anticlimactic, Seifert pointed out, but if it isn't performed thoroughly, cutover can be very traumatic. "Each step is of vital importance," he cautioned the group.

The company also tried a distributed approach to support, but found that it did not work. "We left an implementor at each site," he said, but this was not cost-effective and created more problems, because the implementors were on 24-hour call.

The support has evolved into a central group, which is the single interface for the users for procedural, hardware and software problems.

In an environment like that at Equitable Life Assurance Society of the U.S., control over a distributed systems capability that includes some 308 minicomputers is consolidated in a committee, according to John Gosden, vice-president of corporate services for that company.

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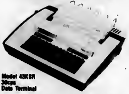

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MDS Mohawk Data Sciences

Software Design Methods Seen Useful to Most

By Don Leavitt
CW Staff

SEATTLE — Although there is disagreement about which of the current software design methodologies is best, almost any installation is better off using one than going without the structure it provides, panelists at an Association for Computing Machinery session agreed here last week.

Before they reached that general conclusion, they provided a large audience with detailed descriptions and insight into the effectiveness of four different methodologies and agreed that the approaches tended to complement more than compete with one another.

Carl Davis, representing the U.S. Army Ballistic Missile Defense Agency, outlined the Software Requirements Engineering Methodology (SREM) used by that organization to clarify software development needs.

SREM includes a requirements statement language, a documentation technique built around what Davis called R-Nets, and a requirements engineering and validation system. But that "first-generation" system suggests the need, among other things, for a formalized decomposition methodology and a language or family of languages focused on the needs and requirements of each phase of the development cycle, Davis noted.

CW at ACM '77

The Structured Analysis and Design Technique (SADT) devised by Doug Ross and others at Softech, Inc. was described by Clement L. McGowan, who said it utilizes a set of simple diagrams, each depicting a limited amount of detail.

It is, he said, a decomposition approach with conventions of notation that "correspond very closely to the subroutine call concept" of programming languages. Input enters each block from the left; output is described to the right; and control statements are "arrowed in" from the top. There is even an indication of where the next level of detail can be found, Davis said.

SADT disciplines and directs the designer's thinking while letting him see and explore various alternatives.

Ed Yourdon of Yourdon, Inc. reviewed how he devised and has since modified his concept of structured design work. He pointed out that a good methodology needs design theories, heuristics and strategies, along with implementation strategies.

He noted that all the approaches presented by the panelists had good points and issued a call for controlled experiments to see which of the methods really work well and to get away from "fuzzy quantification" of results. He reminded the crowd that one of the other speakers had claimed "15% improvement in productivity" and then said there is no way to know what that really means.

Equity Urged In Services Tax

WHITEFIELD, N.H. — If the data processing services industry is "to be taxed at all, [it] should be taxed on an equitable, nondiscriminatory basis with all other industries and professions that also offer these types of services to their customers," according to Alan Rievman, chairman of the Association of Data Processing Service Organizations' (Adapso) Committee on Taxation.

Rievman, speaking at a meeting of the New England State Tax Officials Association, said the current system of taxation is unfair in that organizations that specialize in DP services may be taxed for a particular service whereas firms that offer the same service but are classified in another industry, such as accounting, are not taxed.

Rievman volunteered the assistance of Adapso in drafting new legislation needed in the areas of sales, property and, to a lesser extent, franchise taxes. "The laws, as they exist today, for the most part never contemplated computers or computer services and certainly not a specialized industry selling such services," he said.

Adapso seeks to include in the legislation the parameters of its industry, he said.

"The present piecemeal approach, as it is being applied by some states, will help no one. It will force literally hundreds of smaller computer services companies out of business in an era when they have the potential to increase their revenue and employment bases at a 10% to 20% rate annually," Rievman stated.

One element needed is an understanding of the underlying nature of processing being performed by computer, he said.

For instance, why is a general ledger that is prepared either manually or through the use of batch processing exempt from sales taxes whereas the same job performed using timesharing techniques is subject to sales tax?

" . . . Somehow the transaction has changed, somehow some peculiar thing has occurred to transform this activity from a nontaxable one to a taxable one," Rievman said.

Rievman admitted that the industry itself has done little to explain the nature and processes of its business.

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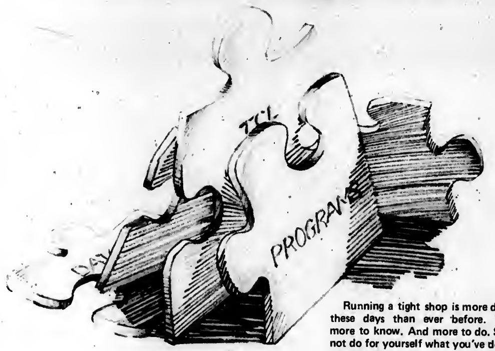

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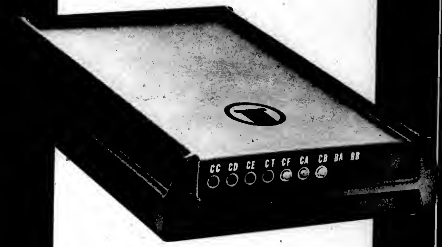

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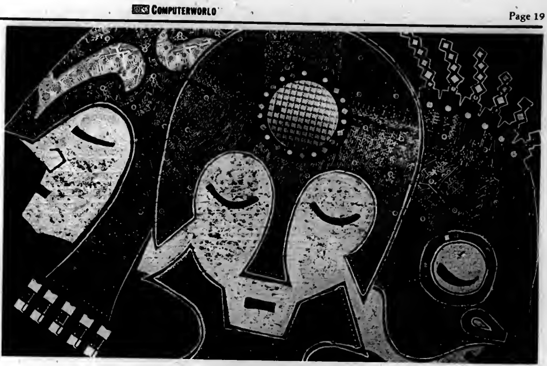


'Faces in the Stone'

Microcomponents Make Statements in Art

By Molly Upton
CW Staff

Microcomponents are the medium in this series of creations portraying man's relation to the world and how it has been affected by technology.

Artist Holly Sweeney expresses her design in integrated circuits and components on printed circuit (PC) boards assembled on wood. The components are selected for their "metamorphical implications" as well as for their decorative quality, she said.

These pieces were created as commissioned works for Semi, a trade association, to present to the inventors of the transistor, Nobel prize recipients Dr. John Bardeen, Dr. Walter Brattain and Dr. William Shockley.

In assembling her works, the artist often cuts up PC boards — rejected components obtained from friends in the industry. The silicon wafers are glued or sometimes secured with small brass nails adjacent to the edges. Occasionally the pieces must be drilled with a jeweler's drill.

The hardest part is integrating the parts smoothly with the overall graphic design so they become an inherent part of that design, she said.

The works pictured here are "fairly small" since they were intended for presentation, although Sweeney has done works as large as six feet, she said.

"Cernnunos" is an ancient Celtic diety who was lord of the animals, Sweeney said. He has horns, and the wheel of fire below him — in reality a brass rotor wheel — is a symbol of the universe.

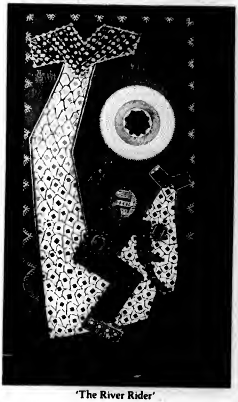
Advances in technology have changed man's relation to the earth and the balance of nature, as a result of which man has greater responsibility as a caretaker of the earth, she explained.

"Faces in the Stone" depicts militaristic figures, perhaps faces of war technology in the past. Often war has caused the advancement of technology, Sweeney said, and again man has more responsibility to control this technology.

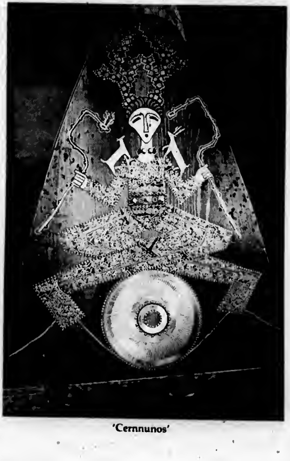
In "The River Rider," man is riding, but also attempting to subdue, a silver trout, which was a magical animal in Celtic mythology. It's ambiguous who's winning, Sweeney said.

Sweeney's intrigue with the use of computer components and the spreading fame associated with these works has enabled her to become a full-time artist. She also works in other media, such as painting and collages.

New Masters



'The River Rider'



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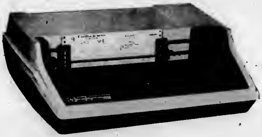

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Editorial

Apples and Oranges

The recent difficulties experienced by some analysts — and by *Computerworld* — in positioning the new IBM 3031 and 3032 processors within the IBM line and against competition point to two problems within the industry.

First, there are no universally accepted measures for computer system performance.

Second, the announcements — and IBM's handling of them — show that IBM does not want users to be able to really compare comparable systems.

Second things first. In the announcements, IBM was careful to position the machines in a way that had more to do with that firm's legal problems than in a way that would be comprehensible to computer users.

IBM always tries to show it is giving increased performance for slightly increased prices. However, the 3031 and 3032 are actually giving users slightly increased performance for a lower price.

But because IBM does not want to be viewed as undercutting its present line — and the equipment of its competitors — this time it chose to compare the new systems with ones that are not truly in the same classification.

Therefore, the firm positioned the 3031 against the 370/148 when it should be compared more properly with the 370/158, and it placed the 3032 in competition with the 158 instead of its true competitor, the 168.

While the move fooled no one — assuredly to the regret of IBM — it did serve to confuse the way in which industry analysts rate the machines. And it was a disservice to the user community.

In the future IBM should not avoid the messy questions that arise from its price-cutting tactics. It should honestly position its machines against their competitors — certainly its salesmen in the field are selling the machines against their real competitors and not the paper competitors of the IBM press releases.

Fancy foot work, if not outright dissembling, will not fool many people. IBM should call a price cut for what it is — certainly its competitors and the legal watchdogs know it for what it is, even if the lawyers may have an easier time defending the move in court when it is not stated baldly.

The second part of the problem is more difficult to overcome. There are few people in the industry unbiased enough to establish a CPU rating system that makes sense and that would be accepted by all.

Those whose machines have very high execution rates scream for Mips ratings, while those with faster channels call for throughput measurements. No one is happy with the systems set up by others.

Obviously, no rating system will be perfect, but there is a crying need to establish some scheme that will be meaningful and fair at the same time.

We propose to do just that. Over the next few months we will be talking to industry analysts — both within companies and more independent ones — to try to find a system that will be usable.

We invite input from anyone — either in informal conversation or more formal communications. Get in touch.

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Letters to the Editor

Price Impact on 370/158?

The article in the Oct. 10 issue concerning IBM's "30 Series" announcements was very comprehensive and well received. As manager of a large 370/145 shop, I have been exposed to normal IBM announcement propaganda, as well as countering announcements and speculation from Itel Corp.

However, one major question remains unanswered in my mind. That is, what is the expected impact on the used market price of the 370/158-1? I understand that there are thousands of these machines in use, with a high percentage purchased or owned by third parties. As you pointed out in your article, the power of this machine is only six points short of the 3031.

I now have a purchase quote from IBM of $1,000,000 for a 2M-byte 3031. Obviously, I would not pay more than that for a 158-1 or 158-3. I speculate that the 158-3 purchase price would find a level some amount less than the 3031 and 158-1 some $100,000 less.

I respectfully request that you speculate on this subject and suggest that it would be excellent material for a follow-up article.

You have my permision to print this letter, but I request that my name and company be kept confidential so that my strategic position with vendors is protected.

Unneeded Confusion

The IBM systems matrix headlined in the Oct. 10 issue is inaccurate and could be extremely misleading concerning the relative performance [and price/performance] of both the 370 and 30 series product lines.

The primary problem is the CPU power factors that were used. The International Data Corp. (IDC) ratings between the 158 and 168 are wrong and have been perpetuated by various performance rating systems which have used them as a base. Since the 30 series has been related to 370 performance, the whole picture has been distorted.

According to the IDC ratings, the 370/168 has 2.17 times the CPU power of the 370/158. This relationship should be approximately 2.9. Anyone expecting a 3032 to be 30%-50% faster than a 370/168 is going to be disappointed, and I would certainly hope to get more than a 25% performance improvement from the 3033 [over the 3032] if I am going to pay 50% more for the basic system. Not even IBM can rewrite economy of scale to that degree.

Both IDC and *Computerworld* should go back to the drawing board.

S.S. Tyler
Mountain View, Calif.

Beware of Crumbling Plinths

In reference to Frank K. Bindar ["DP Education Worthless in Everyday Use," CW, Oct. 3]: May he be rapped in the shin by a crumbling Byzantine plinth.

Diana Mayr
Salem, N.H.

Prison System Uses NCIC

Jeroma Daunt's commentary on the worth of the FBI's National Crime Information Center (NCIC) [CW, Oct. 10] can be supported further.

The federal prison system uses the NCIC criminal history file to determine recidivism rates of inmates following their release from federal custody. Studies relate the prison environment to recidivism rates in an effort to weed out ineffective programs and replace them.

I agree with Daunt. "The NCIC works — let's keep it."

James W. Mullaney
Dunkirk, Md.

Data Past

Five Years Ago
Oct. 25, 1972

NEW YORK — The Justice Department said it tentatively favored breaking up IBM into separate operating companies, each offering a complete line of computers, peripherals, software, maintenance and other services, and at the same time ensured IBM users they would receive support during the transition.

— — —

DETROIT — Burroughs Corp. introduced the L8000 series of minicomputers featuring "virtual memory" capabilities.

Eight Years Ago
Oct. 29, 1969

LOS ANGELES — Datastation Corp. filed suit against Service Bureau Corp. (SBC) for $1.2 million for an alleged violation of federal antitrust laws. Datastation charged SBC, an IBM subsidiary, with leasing IBM 7094 time at "unreasonably low" rates with the intention of damaging Datastation. SBC denied the charge.

— — —

WASHINGTON, D.C. — Congress initiated an investigation to probe complaints about computer billing systems. Citing reports of "harassing and even threatening letters ground out by computers," Rep. Dan Kuykendall (R-Tenn.) called for the House Committee on Interstate and Foreign Commerce to investigate not only collection practices, but also the practice of mailing out large blocks of unsolicited credit cards to prospective customers.

Motivation, Sex Equality Still DP Concerns

By Jack Stone
Special to CW

"Motivation of DP People" was the subject of a talk I gave on the opening day of the Data Processing Management Association (DPMA) National Conference in D.C. earlier this month. I thought it might be useful to share some of the words I sounded on that occasion and then tell of a fine speech I heard on women in business. As is my wont during such presentations, I availed myself of the opportunity to corral some more data about the wild and wooly human denizens of the DP jungle.

I asked the assembled multitude (104 attendees, to be exact) six questions. The first related to size of installation, and nearly all were medium- or large-scale. The next five asked for a show of hands if the populace felt that the following groups were "motivated, dedicated, loyal, etc., managers and employees": top (non-DP) executives, users, analysts, programmers, operations personnel.

The executives came in at about 30%, which was higher than I expected. Then the numbers slipped downhill fast, converging on about 5% for operators, which allowed me to tee off with this comment:

"Let's look at the operations situation. "Isn't it a bit scary to know that your multimillion-dollar installation (to say nothing of the billions of dollars riding on it) is in the hands of a group of people you feel are not motivated to do the job? To me, at least, it is not only bizarre but fraught with unthinkable possibilities. What would happen to commercial aviation if 95% of the pilots were not properly motivated to do their job?

To "bottom-line it," as they say, my message was this: I believe that the reason for such a widespread lack of motivation (I'm drawing the conclusion because I've asked similar questions during numerous lectures and classes during recent months) is because management does not provide a professional environment — and all that this implies — to meet the real psychological needs of the staff. You see, physical and social needs of the average DPer are pretty well satisfied. But DPers require much, much more in terms of psychic income than they are currently getting. And I for one, think it's not too difficult to please them.

Let's take programmers, for example. I don't think they are asking for the moon when they request such special things as quiet, their own desk, an up-to-date Cobol manual and some decent machine time.

Oh, yes, I'm also including operations in the pie, because operators, you may be surprised to know, view themselves as professionals; after all, if you were an operator on third shift making corporate level decisions, you would feel rather important too, nicht wahr?

The Human Connection

There must be 500 texts on how to build a better working environment, so I'll just conclude this part of the column by noting that DP people can be turned around. They are the major force for change in large organizations and they can change, contrary to what some people think. But the most important influence on carrying out such change lies in the conduct of the DP manager as perceived by the DP employee. Unless this perception is turned around, all efforts to induce a motivating climate are doomed to failure, guaranteed.

The speech on women in business was given by Ida Meson, professor of data processing at Lehigh Community College, who reported on the results from current research (including much of her own efforts during the last three years) on the progress made by women in the DP industry. (She has a neat knack of presenting material in a highly articulate, witty and deliberate style.) She told of increasing progress during recent years toward equalizing DP job opportunities among men and women.

For example, her data suggests that in the middle and lower levels of most DP organizations, women are nearly on a par with men for both management and technical jobs. (I should note that she referenced data and writings of some fellow named Jack Stone, who conducted a CW survey on women in DP last year).

During my interview with her after her talk, she went on to say that at the higher levels of the organization, women are still shut out because of what she termed "subtle" discrimination. "On balance, however, women are probably better off in DP than in other industries," she said.

She offered a three-point program for ending sex discrimination. "First, you must create a positive corporate environment. Search out qualified women managers and place them under supportive males. Second, resocialize the attitudes of the men. Put them into awareness training, which is best performed by male/female teams. Also, get men to socialize with women.

"Third, get women into management training particularly in dealing with healthy team work. Females lack confidence and therefore are their own worst enemies. Do you know that one major reason why there aren't more women managers across the country is because women don't assert themselves enough and push hard for those jobs."

Licensing, Certification Not Same Process

By Kenniston W. Lord Jr.
Special to CW

There are those who say both certification and licensing are solutions in search of problems. Some believe the two issues are indeed the same process; others think they are collaborative — that is, separate but associated.

Still others feel that neither is necessary and that those of us who have applied efforts in behalf of either or both are searching for windmills to tilt.

In this and the articles to follow, we will examine both as separate issues, asking the following questions:

- Is there really a problem for which certification and/or licensing can provide a solution?
- If such a problem exists, have licensing and certification properly addressed it and when might such a problem be resolved?
- If no problem exists, why have rational people attempted to provide remedies?
- Whether or not such a problem exists what progress is made, how has it been made and, where do its short- and long-term futures lie?

Before beginning, however, some attempt should be made to clarify the differences between licensing and certification beyond those of mere definition and to demonstrate how those differences can be complementary. It is apparent certification and licensing are a single issue in the minds of many.

In simple terms, certification is an attestation to the *capability* to perform some set of tasks, while licensing is an attestation to the sanction received to perform those tasks. Why such affirmations may be necessary is not the subject here, but will be dealt with in the following articles.

Certification, as originally envisioned by the founders of the Certificate in Data Processing (CDP) program, was contemplated as a means to measure *educational* accomplishment within the business data processing field.

Joe Rigo was exactly right when he said recent college graduates have more success than others in passing the examination, but totally incorrect when he said the test is one of useless facts and information.

Thus, for whatever reason one sits for the exam, he is paying for the right to demonstrate practical and academic accomplishment as a means of measurement among peers. To an extent, the satisfaction received is largely personal.

There is no great preponderance of evidence that CDP holders have been in singular demand in the job market. Thus, the raison d'etre for a person to have the CDP cetificate remains of one of the personal demonstration of accomplishment.

This is not to imply that a noncertified individual cannot perform as adequately as the certified individual.

As, the number of certificate holders increases, however, there is a rising consciousness of the rigors required to pass the CDP exam, and many CDP holders are finding themselves in positions of leverage. The encouragement to obtain the certificate is expanding, as evidenced in several corporate-supported CDP prepartion programs, notably Allstate Insurance.

. . . And in This Corner

The basic question which must finally be addressed will take the form of the following analogy: If you were a candidate for open-heart surgery, would you prefer to be operated upon by one who had demonstrated his knowledge of the processes separately from on-the-job training and performance skills he may have acquired?

There are certainly instances where one has received the training and can perform the work. Certainly, there are some doctors and surgeons who have learned from the books.

But given the choice, would you not be operated upon by one who has both? Certification, if it is nothing else, is a measurement of a person's ability to apply knowledge to a problem. It is assumed that if he has the knowledge, he also has the *ability* to apply that knowledge in the performance of the tasks.

Licensing, on the other hand, is a means of controlling who will actually perform the task once the requisite *knowledge* has been demonstrated.

The emphasis should not be lost. Demonstrated knowledge should preceed any "official" sanction to perform such tasks. Further, that sanction should be applied to only certain kinds of tasks.

What must tie the two concepts together is, on the one hand, a system of generally accepted practices for the people involved and, on the other, a system of mandatory systems standards for applications.

The logical question now becomes this: Are such standards for systems and people necessary, "socially desirable" or absolutely unnecessary?

If they are necessary, why are we not working toward them? If they are absolutely unnecessary, why does a 14-year-old certification effort continue to struggle for existence? And if they are only "socially desirable," are we not expending a tremendous effort with no perceivable objective?

If we can assume that all efforts in behalf of licensing and certification were undertaken as the rational actions of rational people, it therefore follows that someone sees something that others of our number do not see; the priorities may merely be confused. And that will be the topic of the next article in this sequence.

Alan Taylor is on vacation this week.

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Package Gives User Control of Dumps

By Don Leavitt
CW Staff

LOUISVILLE, Ky. — Like many other IBM installations, the data center for Blue Cross/Blue Shield/Delta Dental of Kentucky often found itself overwhelmed with the amount of output generated by an Abend.

With the hope of reducing the amount of output involved in a full-blown Abend dump and aiding in the analysis of the problem that caused the Abend, the center installed the Abend-Aid package from Tomark of Cleveland in September 1976.

After a year of use, the two prime objectives have been "more than met" by Abend-Aid, according to Emmett Simpson, the center's manager of data base support/software services.

Before the package was in place, the staff had Abend dumps requiring 75 printed pages. With the Tomark software, printed output has been reduced to an average of five pages per "dump," Simpson said.

"Very little of a full dump is actually used for problem determination," he added. "What is used is dependent on the type of Abend, and Abend-Aid will search only those control blocks necessary to solve the problem."

When Abend-Aid finds an exact reason for an Abend, that reason is printed, along with other pertinent data, on one page. Other pages are used for data file information, Simpson said, noting the explanation of the problem is so concise programmers seldom have to use manuals for interpretation.

Should the programmer require more information, however, Abend-Aid provides a reference to the most useful manual, he added.

In cases where Abend-Aid cannot determine the cause of an Abend, a full IBM dump is given. But this is preceded by a printout of the data management control blocks so the programmer still saves time, Simpson stated.

The user predetermines how Abend-Aid should handle each type of Abend code; this handling can be applied selectively so Abend-Aid processing is bypassed, for example, for certain jobs or programs.

Getting the package installed and keeping it up and running has been very easy, Simpson continued. Installation took "about four minutes elapsed clock time" on the center's 370/158, he recalled.

Since then, he said, the center encountered two problems when using the package, but they were solved over the phone. "In talking with Walt Thomas [at Tomark], the solution to both problems were found."

And "in both cases, the problem was our fault and not Abend-Aid's," he volunteered.

'Screen' Eases 'Environ/1' Chores

CINCINNATI — The ENV-Data software recently introduced by Cincom Systems, Inc. was described as an on-line application system which enables users of Cincom's Environ/1 teleprocessing monitor to collect data entered through IBM 3270-type terminals.

Included in the ENV-Data package, but also available separately, Screen is an on-line service routine that enables Environ/1 users to edit and validate input from those same terminals.

Data is captured under ENV-Data by "filling in the blanks" of user-defined screen formats and issuing an appropriate command. Erroneous fields are detected and highlighted by invoking the Screen utility, a Cincom spokesman added.

Edit criteria for validation of data entered at the CRT are defined by the Screen user in a batch program. The editing itself is performed interactively; all errors are typically displayed in high-intensity characters and the cursor is positioned at the first field in error, the spokesman explained.

During execution, Screen will right-justify with leading zeroes and align at a decimal point (if applicable) all numeric fields. It will insert a sign at the rightmost position, defaulting to "+" Cincom noted.

An asterisk will be placed in the first position of required fields when no entry is made by the CRT operator.

Editing capabilities of Screen include the conventional checks for alpha or numeric data and for ranges of acceptable values, both minimum and maximum. However, it also supports table lookup operations to determine the validity of such things as state codes in address fields, Cincom said.

User edits are also provided, allowing the user to add special edit functions, the spokesman added.

The ENV-Data and Screen programs require Cincom's Total data base management system and Environ/1. Those prerequisites can be acquired for $1,100/mo and ENV-Data (including Screen) costs an additional $275/mo plus $1,000 installation fee.

Purchase plans are available for all Cincom software, the company said from 2300 Montana Ave., Cincinnati, Ohio 45211.

'Update' Aids Burroughs Operations

HUNTINGTON BEACH, Calif. — The Update System from Commercial Business Applications (CBA) reduces the cost and enhances the operation of a middle- to large-scale Burroughs installation by improving the efficiency of program maintenance and the reliability of program documentation, according to a spokesman.

The package appears to be a source program library facility, similar in general purpose to several packages that have been available to the IBM-oriented user for some time. The Update System, for example, manages the storage and updating of card images on tape, disk or disk packs.

In addition to the expected add, change and delete functions, the user can create new modules through INCLUDE and COPY facilities, CBA said. The package also allows the user to trigger assembly, compilation or execution runs of the stored card image files.

When a user's module is initially constructed and entered in the Update System, a sequence number if assigned to each card image. That number identifies the card image in the same way that assigned names designate modules or groups of modules, called "volumes" in this system, the spokesman explained.

Update processing can be addressed to any of three levels: volume, module or card image, he noted.

Written largely in Cobol, the system requires 68K decimal words on a Burroughs mainframe and can be leased for $178/mo for a minimum three-month period. CBA is at 17511 Crown Circle, Huntington Beach, Calif. 92649.

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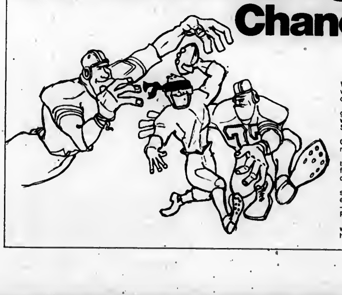

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HIS Beefs Up Software for Its Level 6 Mini

WALTHAM, Mass. — Honeywell Information Systems, Inc. plans to introduce two versions of its Gcos 6 operating system and a series of Gcos 6 compatible software modules designed to enhance the capabilities of the company's Level 6 minicomputer.

The current Multi Dimensional Tasking (MDT) Gcos 6 is expected to be compatible with the Mod 400 release, available early next year, which HIS described as optimized for batch, data entry and communications processing. A Gcos 6 Mod 600 release, late next year, adds an advanced ring structure — like Multics, according to the firm — for large, secure multiuser systems.

Beyond that, the modular approach to the operating system support allows users to "mix and match" facilities in order to tailor the mini to their needs, a spokeswoman noted, adding that the modules will be made available in three phases.

Emphasis in the first two phases will be on providing greater multifunctional terminal capability under Level 6 Gcos: remote batch and data entry facilities that can be used concurrently with other modules under Gcos 6 will be available in the first quarter of 1978.

An enhanced Cobol compiler that produces reentrant code and an RPG compiler will be released in the first phase, the spokeswoman added. Other software will allow the Level 6 to emulate HIS' VIP 7700 terminal so the mini can communicate with most large-scale HIS CPUs. Linkage to non-HIS CPUs through IBM 2780-type binary synchronous protocol will be available at the same time, she said.

An initial implementation of High-Level Data Link Control (HDLC) support for the Level 6 will be offered with the remote batch software, she added.

Terminal Polling

In the third quarter — and the second phase of the planned releases — a terminal concentration facility will allow the Level 6 to poll VIP 7200s linked to it. At the same time, ties to non-HIS CPUs will be strengthened through IBM 3780-type "bisync" protocol support, the spokeswoman noted.

A "downline load" feature will allow users to develop programs on a large-scale CPU, then move them to the Level 6 mini for execution, she continued.

The third phase, in the fourth quarter of 1978, will include a full implementation of HDLC support and the compatible data base structures and software required to support an evolution to distributed systems.

Compatible versions of the Level 66 IDS-II data base management system and the Transaction Driven System (TDS) software will be offered for the Level 6. In addition, a Fortran cross-compiler is planned for the same timeframe, HIS noted.

A typical Mod 400 configuration, built around a 72K-word 6/34 and 10M-byte disk subsystem, might include Cobol, the data entry facility, the remote batch feature, HIS communication support and sort facilities. This software would carry a license fee of $9,165, the spokeswoman added.

A typical Mod 600 setup, with a 128K-word 6/43 and a newly announced 67M disk system, might be made up of the Cobol compiler, an assembler, TDS Level 6, IDS-II Level 6, Remote Terminal Concentration software; the HIS communications support and sort routines. This would cost users $39,015 in addition to the hardware rental, she noted.

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For multi-vendor installations we can add a switch to your controller to allow you to connect the IBM-1403 to either of two different computers.

You can rent, lease or buy both the printer and controller. For full information, call or write Joe McDonough, Grumman Data Systems Corporation, 45 Crossways Park Drive, Woodbury, New York 11797. (516) 575-3034. Telex: 96-1430. TWX: 510 221-1842.

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'APO' Adapted To MVS Sites

SUNNYVALE, Calif. — The need to minimize working sets and to reduce paging in virtual systems has resulted in Boole & Babbage Inc.'s introduction of a version of the Automatic Paging Optimizer (APO) for MVS users. Previously, the package was available for OS/VS1 and SVS sites only, a spokesman noted.

APO lets the MVS user measure and automatically restructure programs to maximize memory utilization. By doing this, the user improves throughput while reducing teleprocessing time and system overhead, he added.

The package measures programs in the production environment and produces statistical reports on paging activity and memory usage, by program. It also produces reports on inter-Csect reference patterns of programs to be optimized, then determines the optimal ordering of the module's Csects and creates a working set module.

APO for MVS is currently available for $9,600, Boole & Babbage said from 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

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Initial WCS Application Backs Manufacturers

By Esther Surden
CW Staff

LOWELL, Mass. — The WCS/20 and WCS/30 small business systems announced recently by Wang Laboratories, Inc. [CW, Oct. 17] include a range of software that includes support for manufacturers.

The systems' operating system which runs in 16K to 32K bytes of memory, supports multiple CRTs running any number of jobs concurrently. Using the virtual memory technique, the system allows each user at a CRT to "see" 1M byte of memory, the firm said.

A data management software program enables the systems to handle sequential and indexed files. A third access mode allows a program to switch between sequential and random access on the same file, the company stated.

In addition to Ansi Cobol, the systems run RPG-II, which Wang said is compatible with the RPG-II on the IBM 3. Other languages available are Basic, an assembler language and a "procedure" language.

A data entry/file maintenance utility, interactive text editor and symbolic debug facility are also provided.

In addition, Wang introduced an integrated inventory control and bill of materials processor package. The Manufacturing Management System (MMS) "provides multilevel product explosions and implosions from raw materials to finished goods."

MMS can produce lead time figures for ordering inventory items. The processor also provides updating of parts and subassemblies so that as a component's price increases, every product using that unit is updated.

The system checks inventory on hand against minimum reorder levels selected by the user.

The operating system plus support for the Assembler and one other language — at the user's choice — is bundled into the cost of the hardware.

Additional language processors cost $3,000 each.

The MMS application software distributed on floppy disk costs $3,000. With an accounting module added, the "floppy" version goes up to $6,000.

Distributed on hard disk, the base MMS and the accounting module cost $7,500, Wang said from One Industrial Ave., Lowell, Mass. 01851.

Atsu Shows Nets' Access

BOULDER, Colo. — A 92-page directory showing which remote computing companies offer services in each of 79 metropolitan areas in the U.S. and Canada has been compiled by the Association of Time-Sharing Users (Atsu) as a service to its users and as a product for sale to others.

The 92-page "Geographic Directory" lists companies offering local telephone lines for toll-free access to their services in each area. It also shows what line speeds are supported, whether remote batch terminals can be used and how many, if any, vendor personnel are available in local offices within each area.

The directory is part of a three-volume set of reference reports that have been published by Atsu. The ring-bound documentation is updated monthly and is distributed free to Atsu's 12,000 members, a spokesman said.

"The "Geographic Directory" is available separately to nonmembers for $15 prepaid, he added from the association offices at 75 Manhattan Drive, Boulder Colo. 80303.

Package Gathers SMF I/O Files

KANSAS CITY, Mo. — The SMF-Type6 package from Joseph M. Joyce & Associates supports IBM OS and OS/VS users by accumulating EXCPs (for print lines, cards punched, etc.) for nine of the 36 Sysout classes for all jobs in an SMF file, using the Type 6 SMF record, according to Joyce.

The file may cover a week, a month or any other period of SMF history. The package will list the number of times each job name has run, the number of EXCPs for each of the nine Sysout classes and the number of EXCPs for all other classes, as well as total EXCPs, a spokesman said.

The data reduction handled by SMF-Type6 is controlled by a title card for headings and a selector card for the nine Sysout classes. The program costs $200 and will be shipped within 24 hours of receipt of a signed agreement and a copy of the data control block (DCB) for the user's SMF record.

Joyce & Associates is at 5925 Rockhill Road, Kansas City, Mo. 64110.

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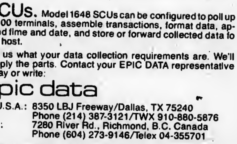
flexible. EPIC DATA terminals can optically read punched badges and 80-column ANSI cards. User-defined keys are available for inputting variable data. Key entry data or time of day is displayed and LEDs are available for prompting.

Terminals can be configured to scan bar codes and magnetic stripes or accommodate other peripherals through RS232 ports. Display options include additional numeric displays, up to 15 LEDs for prompting and a 32-character alpha/numeric display. Serial asynchronous or synchronous communications ports with either RS232 or line driver I/O and a low speed modem may be added. Parallel communications ports are also available. Both PROM and RAM memories are expandable.

Newest Building Block: More to Come in Next Few Months

A self-contained cassette tape recorder providing up to 2.88 megabits of storage for transaction logging or store-and-forward applications is now available. The modular reel-drive tape recorder, like the rest of the building blocks, features high reliability and ease of maintenance. There is no pinch-roller or capstan to wear tape; only the head touches the tape.



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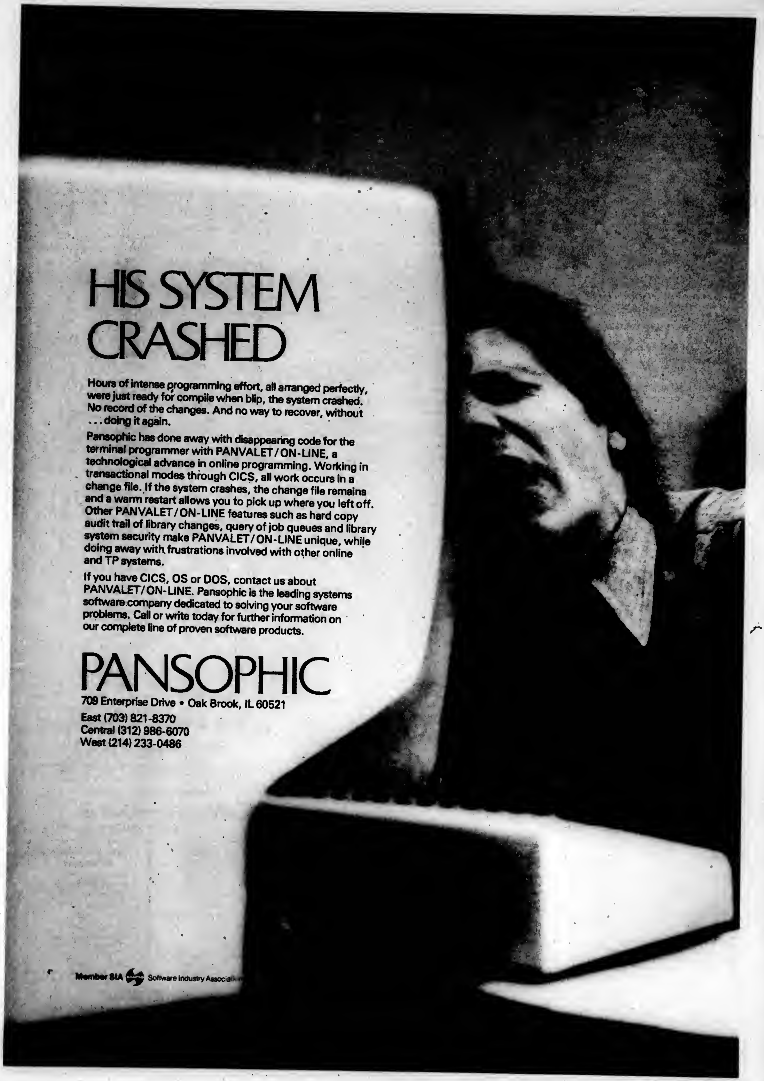

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User Finds Audit Ensures Better Sort Handling

By Donald L. McGinnis
Special to CW

SAN RAFAEL, Calif. — For the past three and a half years, the data center for Fireman's Fund Insurance Co. has been using Syncsort from Whitlow Computer Systems, Inc. to run its sorting. Recently the company acquired another software package, Sortaudit, to implement efficiency improvements in that part of its workload.

Sortaudit, marketed by Whitlow to augment Syncsort, is used to profile sorting activity for general analysis. It also identifies specific inefficient sorts for optimization.

During the first month of using Sortaudit, Fireman's discovered 90 large sorts running inefficiently. After optimization, we saved over $45,000 in annual processing costs on these sorts.

Most of the improvements were made by increasing the amount of main core storage given to the large sorts, reducing their work I/O significantly.

To assist the user in analyzing his sorting activity, Sortaudit produces summary, grid and detail reports from data written on the Systems Management Facilities (SMF) file by each execution of Syncsort.

The summary report identifies total resources used for sorting with six sets of summarized data. The grid report shows the effects on resource usage when the amount of sort core used is varied against file size.

The detail report contains data on each Syncsort execution, selected and formatted by user-entered control statements.

Sortaudit also supports a user exit facility to allow additional processing of sort execution data.

With Sortaudit summary and grid reports, we can measure the "vital signs" of our sort workload. This is useful in our shop, where about 25% of the computer workload is sorting. We can identify where our optimization effort should be spent and how successful the improvements are.

As an example, the grid reports show work I/O counts per megabyte of data sorted (on a matrix of file size by amount of core used for sorting). Our goal is to lower the work I/Os per megabyte. Periodic Sortaudit reports demonstrate our progress.

Overallocating Sorts

It was found that 92% of our sorts overallocated disk work space while 90% skipped the merge phase completely. Moreover, 4% of our sorts caused 90% of the sort work I/O.

Based on these and other facts we are now exploring general changes including reducing core for small sorts, increasing core for large sorts (dynamically based on paging activity), reducing excess overallocation on all sorts, reconfiguring sort work devices and relocating Syncsort load modules.

We have developed a user exit to augment Sortaudit, using the interface provided with the package. Based on actual statistics of each Syncsort execution, our exit routine calculates the recommended amount of disk work space to be used (by our standards), the amount of disk work space over- or underallocated and the work I/Os (testing, production, etc.). This information can then be shown on detail reports when requested.

Also, we created a file of the Syncsort accounting records so SMF files need not be read for subsequent processing.

McGinnis is manager of the performance and application support unit at Fireman's Fund.

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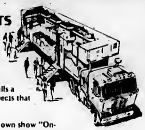

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UCC Boosts CDC Gear

DALLAS — University Computing Co. (UCC) has added a second Control Data Corp. 6600 to its computing center here. It has also converted from Scope to the latest version of Network Operating System/Batch Environment (NOS/BE) software.

UCC's dual 6600 complex is front-ended by two Cope communications controllers that support batch terminals operating in UCC Cope mode, CDC UT200 and IBM Hasp multileaving simulator modes.

UCC's computing facilities, in addition to its CDC 6600 mainframes, consist of multiple coupled Univac 1108/Fasbac systems and 1108 Exec 8 systems.

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For International Nets

CCITT Data Sets Among Show Debuts

By Ronald A. Frank
CW Staff

ATLANTA — Data sets compatible with the standards used by international data communications networks were among a range of products introduced by suppliers at the first International Telecommunications Exposition (Intelcom 77) here recently.

General Datacomm Industries, Inc. of Wilton, Conn., introduced its GDC 2400ES, a CCITT-compatible modem that transmits and receives synchronous binary serial data at either 1,200- or 2,400 bit/sec over both dial-up and private lines.

Charles Johnson, General Datacomm president, shows firm's CCITT data set.

An auto-answer feature is included in the modem that automatically connects the unit to the line when a ring signal is detected. The GDC 2400ES can be used in two-wire half-duplex and four-wire full-duplex applications in both multipoint and point-to-point modes, a spokesman noted.

Auto-dial backup and an optional two-channel multiplexer are available with the data set. The device, which complies with CCITT recommendations V.23, V.24, V.26 and V.28, costs about $2,000 for a basic configuration, the spokesman said.

CW at Intelcom 77

Racal Milgo showed its Modem 26 which operates at 1,200- and 2,400 bit/sec over voice-grade lines and complies with CCITT recommendations V.24 and V.26. The data set features dial backup and has both local and remote diagnostics for operation on multipoint and point-to-point nets.

The basic unit costs about $1,500 from the firm at 8600 N.W. 41st St., Miami, Fla. 33166.

Codex Corp. of Newton, Mass., showed a line of CCITT-type data sets compatible with the V.21, V.23 and V.26 recommendations.

CW Photos by R. Frank

Extel Corp. demonstrated intelligent teleprinter for TWX and Dataphone uses.

The units, which operate at 300-, 1,200- and 2,400 bit/sec, feature dial-up, private-line and secondary channel capabilities. Prices range from $535 for the V.21 private-line unit to $1,310 for the V.26 device with secondary channel.

The CCITT units were quoted at U.S F.O.B. prices because of the variety of additional local costs that vary from country to country, vendors at the Intelcom 77 show said.

In the teleprinter area, Extel Corp. of Northbrook, Ill., introduced its Model B308SWL, a programmable-memory automatic send/receive (ASR) unit that operates at speeds up to 30 char./sec for TWX and Dataphone applications.

The microprocessor-based unit handles three Ascii cheracter sets and includes a standard RS-232 interface. With a 4K memory, the teleprinter costs $2,860 or $100/mo; an 8K memory model costs $3,160 or $110/mo on a one-year lease.

As for data sets geared for U.S. use, Gandalf Data, Inc., of Wheeling, Ill., showed two limited-distance data sets that operate over local wire connections.

The LDS 121 operates at all speeds of "asynchronous data transmission up to 9,600 bit/sec" on four-wire full-duplex and two-wire half-duplex facilities, the company said.

The card-type modem costs about $135 per channel. Over 26-gauge wire at 9,600 bit/-

(Continued on Page 33)

Datagram Link to Packet Nets Urged to Extend User Control

By Ronald A. Frank
CW Staff

ATLANTA — The development of a datagram interface for packet-switched networks will provide users with a more efficient method of operating on packet nets, according to Walter Elden of the NCR Corp.

In remarks presented at a session here on public data networks during the recent International Telecommunications Exposition (Intelcom 77), Elden described efforts now under way within U.S. standards groups to implement a datagram interface as part of the X.25 protocol standard adopted by the Consultative Committee on International Telephone and Telegraph (CCITT) last year.

The X.25 standard primarily utilizes the virtual circuit form of data terminal interface under which control is maintained by the carrier. Under the datagram method of packet transmission, an end-to-end user protocol is established "which implies that the user is in control of both ends of the data path," Elden explained.

Datagrams have been described by Louis Pouzin, director of the French Cyclades packet network, as "a very simple transport facility" that can be utilized as an "underlayer" of a virtual circuit protocol such as the X.25 standard.

As seen by the user, the Datagram method gives greater flexibility in the use of a packet

(Continued on Page 34)

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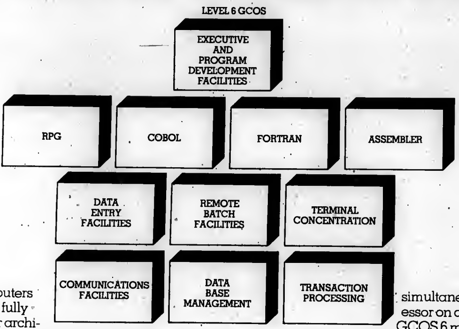

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CW at Intelcom 77

International Differences Seen Threat to Private Lines

By Ronald A. Frank
CW Staff

ATLANTA — Regulatory disputes now going on between transatlantic telecommunications administrations could eliminate today's private-line facilities, according to Brendan McShane, a telecommunications specialist with General Electric.

CW Photo by R. Frank

Luis Terol

Speaking at an International Telecommunications Exposition (Intelcom 77) session dealing with international specialized common carriers, McShane warned that future regulatory decisions "could completely change the rules of the game" for international network users.

Other speakers appearing at the session represented various types of carriers. Stuart Mathison of Telenet described the cost advantages of operating on a packet network for overseas data communications applications. Packet transmission can cost about $50/hour compared with $150/hour for Telex service and $108/hour for international data phone facilities, he said.

But Luis Terol of CTNE, the Spanish Telecommunications authority, said there is a reluctance on the part of European countries to interface with new carriers such as Telenet unless they go through facilities provided by existing international record carriers (IRC).

"A multiplicity of carriers will complicate the technical operations and administration" of overseas networks, Terol told the attendees.

The CTNE packet network began in 1973 with 177 terminals and today has about 4,700 terminals connected, Terol said. It is now being modified so it will be able to interface with other X.25-type packet nets by 1978, he said.

Howard White of ITT World Communications took issue with Federal Communications Commission decisions which he said gave firms like Telenet and Tymnet an advantage over the IRCs. If these new carriers operate directly from many U.S. cities to overseas points, then the IRCs should no longer be restricted to operating only through certain gateway cities in this country, he said.

Robert Conn of Western Union International said Datel service should be changed so the IRCs can provide alternate voice and data instead of data only. He agreed that the IRCs should be allowed to get away from gateway restrictions so they can operate directly into "hinterland" cities in the U.S.

If users want freer entry with more competition, White said, then they must be prepared for freer elimination of less profitable services by existing international carriers. New carriers will lead to higher costs for less heavily used services provided by the existing IRCs, he warned.

CCITT Data Sets Debut

(Continued from Page 31)

sec, the data set will transmit up to five miles, the firm said.

The Gandalf RM 3309 was designed for networks running at speeds up to 19.2 bit/sec and "is guaranteed to transmit a distance of eight miles" over 26-gauge wire. The card-type modem costs less than $600, the company said.

Gandalf also introduced its TTS 400 transmission test set, which it described as an installation and maintenance aid with both asynchronous and synchronous equipment. It costs $785 and provides the user with a variety of diagnostic indications.

In the communications controller category, Digital Communications Corp., Gaithersburg, Md., showed its CP-9000 communications processor which includes multiple microprocessors and can be used as a concentrator, multiplexer, front end or packet switch.

The modular system can support up to 480 lines in a private-line network with each microprocessor line-processing unit handling up to eight lines.

The system supports CCITT X.25, synchronous Data Link Control (SDLC) and Binary Synchronous Communications protocols and includes diagnostic features.

A typical system with 64K of memory, 12 channels with eight asynchronous low-speed ports and four synchronous medium-speed ports costs $20,000 to $25,000 depending on options.

Timeplex, Inc., Hackensack, N.J., showed its Model B101 bit-interleaved time-division multiplexer that complies with CCITT recommendation R101B.

Designed for Telex and data networks, the multiplexer can handle up to 96 channels and provides automatic fallback to redundant common control, the company said.

A typical Telex application handling 46 channels costs about $12,000.

Digital Communications Associates, Inc. of Norcross, Ga., showed its Smart/Network which the vendor said can handle geographically dispersed asynchronous data terminals while maintaining error-free transmission and compatibility with "all common computers and terminal types."

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Tymnet Cuts Packet Prices After Gaining Tariff OK

CUPERTINO, Calif. — The Federal Communications Commission (FCC) has approved revisions to Tymnet, Inc.'s Tariff No. 1. The approval resulted in reduced prices for users of Tymnet's public packet network services, the carrier said from its headquarters here.

The revisions, effective immediately, match prices for network interface equipment more closely to users' actual requirements as measured by the number of terminals requiring simultaneous support, the firm said.

The major effect is on the 1,200-bit/-sec service offered by Tymnet. Currently all users of this service incur a monthly charge of $2,750 for interface equipment which can support up to 62 simultaneous terminal users. Many 1,200-bit/sec users, however, have requirements which do not approach this 62-terminal level, a spokesman noted.

For up to eight terminals meeting simultaneous support, the price is now $1,250; for up to 16 terminals, $1,750; and for up to 30 terminals, the price is $2,450. The 62-terminal capability price is unchanged.

Also included in the revised tariff is a new option for users of the 110- to 300 bit/sec Tymnet service, currently offered at increments of up to 8, 30 and 62 terminals. The option is for users needing support for a terminal population of up to 16 terminals at a monthly price of $1,500.

Tymnet also announced another service which reportedly allows users of synchronous host interfaces to the Tymnet public packet network to have an economic backup line. An optional service, it is priced at $250 more than the cost of single-access line service, plus Tymnet's actual cost of providing the line.

Tymnet services interface customer host computers to customer terminals at more than 110 locations in the U.S. and the carrier has reached agreements "with all major international record carriers" which expand access to the network from more than a dozen business centers overseas, the company said.

Direct-Dial Data Station Runs at 2,400 Bit/Sec

MIAMI — A high-speed direct-dial data station, the 40+TK1 from ICC/Milgo, can reportedly cut costs and improve operator efficiency in a variety of corporate communications systems.

The 40+TK1, which stores messages in an MOS solid-state buffer rather than on paper tape or magnetic tapes, was designed to replace low-speed, leased-line and tape-operated terminals. It is suitable for use in systems designed for message handling, reservations, invoicing, order entry and similar functions, the company said.

Data transmission speed of the 40+TK1 can range from 1,200- to 2,400 bit/sec. Operation is over dial-up lines.

Since all data communications functions in the data station are fully automatic operators are given time to concentrate on preparing messages, according to a spokesman. Messages can be entered while the control module is actively communicating with the central site.

The 40+TK1 data station includes an ICC 40+ data display system, keyboard and control modules. It also includes a communications control module and buffer, a 110 char./sec printer and desk.

The terminal costs $14,500 or $295/mo with maintenance on a five-year lease. ICC/Milgo is at 8600 N.W. 41st St., Miami, Fla. 33166.

Elden Urges Datagram Packet Interface

(Continued from Page 31)

net. Datagrams, which can be transferred between the network and the user's terminal, can be handled independently of each other by the network with minimum delay and may arrive in a different order than the one in which they entered the net, Elden said.

If a network addressee cannot be reached on the network, the datagram will be returned to the sender with the appropriate code in the header. In addition, a user terminal may request the network to prevent another address from sending Datagrams to that terminal, he noted.

According to Elden, work toward the formation of a Datagram standard is proceeding the American National Standards Institute (Ansi) group X3S37, which is Task Group 7 of the Ansi X3S3 standards group. X3S37 is charged with public data network standards formulation.

The work of the Ansi task force has resulted in a document entitled "Generic Requirements for Datagram Service," which has been presented to the International Standards Organization (ISO).

The ISO document states that "the U.S. is of the belief that there are user applications wherein a more cost-effective service, based upon the datagram type of packet switching, can be achieved, as compared with virtual circuit packet switching (X.25)."

User's applications for packet nets exhibit the need for a simple data transport type of service wherein fast transport times, short messages and simple functionality of the data terminal and the network are needed, the ISO document said.

Virtual circuit service is not as efficient as datagram service for these types of applications and that is why a datagram standard should be developed, the U.S. position paper said. The applications that will benefit from a datagram type of packet operation are terminal-to-terminal operations and inquiry/response communications.

Increased support will be needed if international standards bodies such as ISO and CCITT undertake a real effort at developing a datagram standard, Elden said. "Since CCITT members are the carriers which would actually provide the service, datagram standardization will be further delayed, until either the carriers or the users express greater need for this new, potentially economic service," he said.

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Then sit back and see how well it works. Our terminals not only cost less than IBM's, you'll find they give you more. Like in-line, on-line and off-line diagnostic capability. Local display-to-print capability. OCR Wand. High-resolution, non-glare CRT. Prompting line. Cursor position indicator. Statistical package. And 10-key numeric pad. Features you won't get from IBM for years. If ever. And all Trivex 3270-compatible devices are microprocessor controlled. They're software-modifiable to future changes in network requirements.

When your 30 days are up, either unplug our Plus 70 System and send it back or keep it. It's a painless decision.

To try our high-calibre terminals, call the number below or write us on your letterhead. Our salesman will bring you information on our free 30-day Mix and Match Plan along with an Executive Decision-Making Kit complete with operating instructions and a real bullet. It's one offer you should bite on.

TRIVEX

Write Trivex, Inc., 3180 Red Hill Avenue, Costa Mesa, Calif., 92626 (714) 546-7781, (800) 854-3810 or 854-3819.

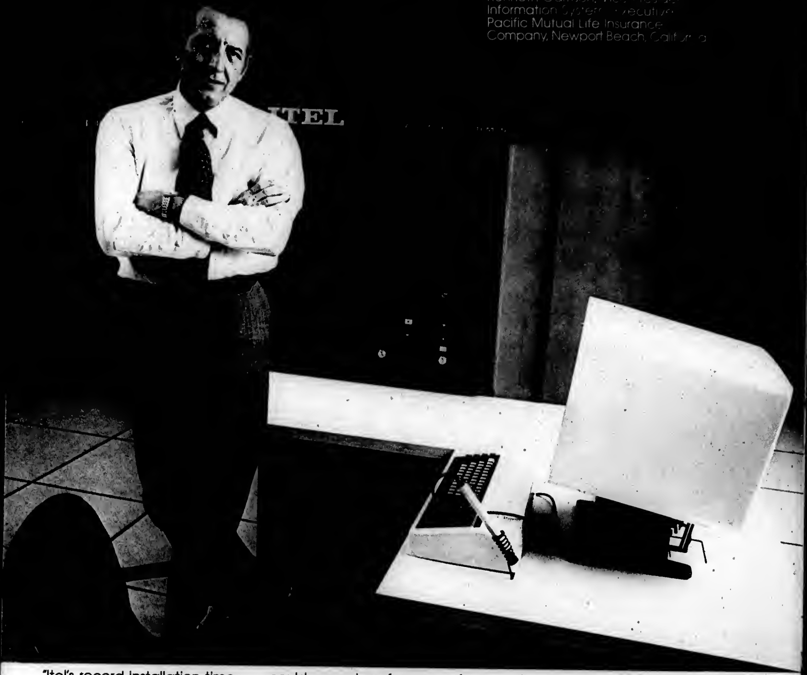
Offices in San Jose, CA (408) 226-3766/ Oak Brook, IL (312) 325-8108/ Havertown, PA (215) 446-6496/ Ft. Lee, NJ (201) 461-4712

European Distributor: Synelec, Telex 22114 Paris, Brussels, Munich, Amsterdam

Don't Replace Your 3270s Without Sending For Our Kit.

"Very impressive... Itel's Advanced System was installed and fully functional within three hours and fifteen minutes."

Kenneth Garrison, Vice President
Information Systems Executive
Pacific Mutual Life Insurance
Company, Newport Beach, California



"Itel's record installation time was outstanding, especially when ours was the very first Advanced System to be installed. And its performance has proven to be as impressive as its installation.

"With more than $1.7 billion in assests to manage, you can imagine the variety of complex tasks to which we put our EDP equipment. Of course, we knew we could expect performance from the system. Before replacing our IBM 370/155 with Itel's AS-5, we conducted extensive pre-installation tests to determine compatibility, reliability and error correction capabilities of the Advanced System. And all tasks were completed in equal or faster time compared to IBM's 370/158.

"Also contributing to our decision was the fact that the Advanced System would protect our investment in programming, documentation and personnel training. So, not only did we save on initial cost, but we're saving money in the long run, too.

"Choosing the AS-5 was a good move–we've been thoroughly pleased with the Advanced System and with Itel every step of the way. We sincerely feel that Itel deserves every accolade possible for the quality and reliability of their Advanced System, and the quality and professionalism of their people."

"Incredibly enough, we made no software changes at all when we put the Itel Advanced System™ into production."

Dr. [illegible]
Computation Center, [illegible]
University of [illegible] and
Technology, Ames, Iowa

"We're thoroughly pleased with the AS-5. Installation was completed with remarkable speed, and its performance has been outstanding. We're quite proud that Iowa State is the site of Itel's second Advanced System installation.

"We were initially receptive to the AS-5 because there seemed to be economic advantages involved. We saw the opportunity to replace the IBM 370/158 and to increase memory size, add secondary storage, upgrade our magnetic tape system and modify the CPU to a model III, all within a price range we could afford. And to be able to do all that without software modifications and without utilizing more space is positively remarkable.

"Here at the university, our Advanced System has between fifteen and twenty thousand users. It handles a wide range of activities—from course-related student programs to university-generated academic research. And its performance has been very impressive.

"In fact, we've been very favorably impressed in all areas of contact with Itel—from the outstanding performance of their products to the professional standards of their personnel and the excellence of the service they've given us."

ITEL CORPORATION
Data Products Group
One Embarcadero Center
San Francisco, California 94111
Telephone: (415) 955-0000

Telemax Cuts Phone Bills

VIENNA, Va — A computerized telecommunications service from TDX Systems, Inc. promises savings for smaller business offices with monthly long-distance telephone charges above $3,000, the company claimed.

The Telemax II Telephone Management and Control System will reportedly save a user up to 30% of annual phone charges. TDX is guaranteeing a minimum savings of 10%, over and above the cost of its service, a spokesman said.

A Telemax II user is linked by tie line to a microcomputer located at an office of Southern Pacific Communications Corp. (SP), a specialized common carrier. In turn, the SP office is linked by data circuit to a TDX Interdata 7/32 host CPU in Virginia.

A long-distance telephone call for the user's office is routed through his own Wats lines as well as over SP's network.

At the end of each month, the user receives from TDX a detailed call report.

Typical charges for a user with four phone lines is about $500/mo while a user with eight phone lines would pay about $1,250/mo. Exact monthly costs of the Telemax II service depend on the user's telephone traffice volume.

Prices include support and maintenance, TDX noted from 1920 Aline Ave., Vienna, Va., 22180.

Software Emulator Allows Syfa to Enter 3270 Nets

IRVINE, Calif. — A software emulator that permits multifunction Syfa network processing systems to be used in remote IBM 3270 networks has been announced by Computer Automation, Inc.

The 3270 emulation capability reportedly enables a Syfa information station operator to switch between 3270 mode and regular Syfa mode at any time. In 3270 mode, the Syfa station appears to an IBM mainframe to be a standard 3270 family CRT terminal, the firm said.

Networks presently utilizing 3270 terminals can now use Syfa for concurrent data entry operations, local processing and batch communications while still retaining concurrent 3270 interactive communications capabilities, according to a spokesman.

Switching is executed by the appropriate Syfa Business-Oriented Language Sybol program, which causes temporary suspension of the active program. Control of the Syfa station passes to the 3270 emulation software, which alerts the mainframe it is ready for the polling sequence and performance of standard 3270 operations.

By striking a control key, the emulator software relinquishes control of the information station, posts its status as off-line and returns the terminal to Syfa mode, the firm said.

A separate program written in Sybol can additionally use the 3270 emulator to send batch remote job entry type of inquiries to the mainframe and receive appropriate replies.

This facility, which requires "minor modification to IBM applications software," enables the user to transmit and receive unformatted batch data intermingled with interactive 3270 communications, the spokesman said.

The 3270 emulation software is available for a one-time charge of $15,000. Computer Automation is at 18651 Von Karman, Irvine, Calif. 92713.

ISC Color CRT Gets Price Drop

NORCROSS, Ga. — Intelligent Systems Corp. (ISC), has reduced the price of its Intecolor 8001 eight-color intelligent data terminal to $995.

This price applies to orders of 100 or more units. It also applies to a single evaluation unit on a cash-with-order basis. Thirty-day delivery of the unit is guaranteed or the money is refunded, the company claimed.

The Intecolor 8001 comes complete with random-access refresh memory, Intel 8080 microprocessor, terminal control software, a keyboard, a 19-in. eight-color CRT, RS-232C I/O, selectable transmission rate to 9,600 bit/sec. and a user's manual.

ISC is at 5965 Peachtree Corners East, Norcross, Ga. 30071.

Terminal Bows

DALLAS — Crown Communications, Inc., has introduced a buffered data terminal called the CCI 5000.

The unit utilizes a cassette tape for data storage and communication with time-sharing computer centers and, according to the company, offers advantages over keyboard and paper tape send/receive devices.

On-line costs are reduced by the unit's ability to transmit data at speeds 10 times greater than possible via keyboard, Crown claimed. Over dedicated lines, 2,400 char./-sec transmission is possible.

The terminal costs "just under $2,000," Crown said from 2750 Northaven Road, Dallas, Texas 75229.

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The offer is made only by the Prospectus.

Not a New Issue October 13, 1977

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Unit Detects Disk Problems

User Averts Disaster With $2.50 Device

By Jeffry Beeler
CW Staff

KENNEWICK, Wash. — It could have caused an expensive and destructive head crash, but fortuantely for Kennewick General Hospital here, a defect in a newly purchased disk cartridge was spotted before computer operators had a chance to insert the faulty unit in a disk drive.

How did the hospital discover the damaged cartridge and avert a potential DP room disaster? Credit the feat to a tiny, automatic impact detector that had been attached to the top of the cartridge immediately prior to shipment.

Manufactured by Media Recovery, Inc. in Graham, Texas, the impact sensor fits almost any model of disk cartridge. Although it is sold primarily in large quantities to original equipment manufacturers, it is also available directly to end users for installation in the field.

Shockwatch, as the unit is called by its manufacturer, consists primarily of an .8-in.-long tube mounted on a small plastic plaque that carries handling instructions in bold letters.

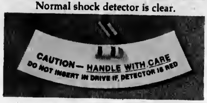
Under most circumstances, the tube is colorless. But when it receives an impact of sufficient force, the detector automatically turns vivid red to indicate possible disk cartridge damage.

Ninety-five perent of the time, a cartridge whose impact detector has been activated in this way will cause a head crash or other hardware malfunction if inserted in a computer's disk drive, according to Robert Foley, president of Media Recovery. A message on Shockwatch's plastic plaque therefore warns computer operators not to use any cartridge whose sensor has turned red.

If users heed this warning, they can prevent many head crashes that might otherwise occur as well as minimize downtime, lost data and a host of other common DP ailments, Foley added.

CAUTION— HANDLE WITH CARE
DO NOT INSERT IN DRIVE IF DETECTOR IS RED

Normal shock detector is clear.


CAUTION— HANDLE WITH CARE
DO NOT INSERT IN DRIVE IF DETECTOR IS RED

Shock detector darkens after impact.

More Means Less

Foley admitted disk cartridges equipped with Shockwatch cost slightly more than their unprotected counterparts. But, he argued, this small additional investment — the detectors cost $2.50 each — is insignificant compared with the hardware repair and replacement costs the product eliminates.

"Whenever computer users ask me why they should install impact detectors on their disk cartridges, I'm always reminded of the television commierical in which the guy in the auto body shop says to his customers, 'Pay me now, or pay me later,'" Foley added..

Shockwatch does more, however, than just detect disk cartridge damage after it has already occurred. It also prevents the add-on memory devices from being harmed in the first place, Foley said.

"When computer operators know that every time they make a wrong move the impact detector will blow the whistle on them, they become very careful about how they handle their disk cartridges," he explained.

Nothing probably illustrates the product's value as a hardware protector better than the recent incident at Kennewick General Hospital.

Last February, CFI Memories, Inc., one of Burroughs Corp.'s add-on memory suppliers, shipped the hospital two disk cartriges equipped with the automatic shock detectors.

When the cartridges were inspected upon arrival, hospital officials noticed that both detectors had turned red. Concluding that the cartridges had been damaged during shipment, they returned the products to Burroughs' branch office in Spokane, Wash., which in turn sent them to CFI Memories' headquarters in Anaheim, Calif., for testing.

(Continued on Page 40)

Dry-Silver COM Unit Copies Displays

ST. PAUL, Minn. — A dry-silver computer output microfilm (COM) system has been introduced by the 3M Co.

The 715 combines the advantages of other CRT systems and those of dry-silver units which require no chemical processing, a spokeswoman claimed. The system can photograph an image on a CRT using dry-silver film, a capability which, according to the spokeswoman, was not previously feasible because of the low light levels of CRTs.

The 715 system can also expose traditional wet film, she noted, so users phase into dry film.

A Digital Equipment Corp. PDP-8A minicomputer controls the system. Its architecture permits an overlap of data input processing and camera movement operations, which contributes to a system speed, 3M said.

Operator communications with the system are handled via the command console, whose principal component is a DEC LA36 Decwriter II.

The output speed of the 715 system is less than one minute per fiche, the spokeswoman said. Other features include an orange-colored phosphor in the display tube, a motorized camera mount, intensity control and uniform forms exposure.

The price of the system, whose delivery is expected during the first quarter of 1978, is $137,500 from 3M at Box 33686, St. Paul, Minn. 55133.

Page Printer Works in 20 Sec

TINTON FALLS, N.J. — A thermal page printer that is said to produce a hard copy of a CRT screen in less than 20 sec. has been unveiled by the Perkin-Elmer Corp.

The Model 650 has a full-screen buffer which allows concurrent printing and terminal processing; it can print 100 char/sec on a standard-size piece of paper according to a spokesman.

The paper is impregnated with a colorless, heat-sensitive dye that changes color as selected dots on the printer's fixed head are heated.

This type of printer differs from electrostatic printers, which deposit a substance upon the paper, and from electrosensitive (capacitive) printers, which remove the top layer from the paper, the spokesman explained.

Printing is controlled by a Motorola 6800 microprocessor with a complete screen buffer memory. Data received from the CRT is stored in the 1,920-char. buffer of the page

(Continued on Page 40)

DMC

We can make any dummy smart, even intelligent.

Plug any dumb terminal into the DMC CommFile. You immediately get a powerful text storage, processing and communication system that is amazingly simple to use. With CommFile, you can:
- Collect and store text from your terminal or timesharing system;
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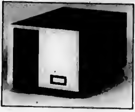

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Detector Helps Hospital Sidestep Disk Disaster

(Continued from Page 39)

Commenting on the results of those tests in a letter dated last Feb. 11, CFI's OEM sales manager, Norman Jividen, told Burroughs officials that one of the disks "had moved on the hub, giving excessive horizontal runout, and inside the plastic cover had a dent in the edge of the disk."

Then he noted, "One of the disks probably would have hit the head if it had been used because there was a dent in the edge of the disk."

In conclusion, Jividen added, "I think this shows the effectiveness and the value of the detector."

How did Shockwatch spot the damaged cartridges at Kennewick General Hospital? Foley attributed the discovery to the unit's sensing mechanism, which he compared to a mercury-filled thermometer.

A small quantity of red liquid is suspended in the device's middle, which is obscured from view when placed in a disk cartridge. If the sensor receives a shock of 115 Gs or more(equivalent to the force of a one-foot fall), the liquid's surface tension breaks, and the red substance spreads throughout the visible portion of the tube.

Rainy Day Idea

The idea for this sensing mechanism originated about two years ago with a member of Media Recovery's engineering staff. While driving home one day after a rainstorm the engineer encountered an unexpected obstacle in the road ahead and hit the brakes to avoid an accident.

As he did so, the sudden stop broke the surface tension of the water droplets on the top of the car and sent them streaming down the windshield.

Immediately grasping the implications of what he had just seen, the excited engineer rushed home and, using a plastic straw and some water, improvised a crude prototype of Shockwatch in his kitchen.

During the next few month, Foley and his engineering staff gradually refined the device and convinced skeptical disk cartridge and drive manufacturers that it would not activate prematurely or otherwise malfunction. Only after months of testing did Media Recovery finally introduce the product last January.

Printer Works in 20 Sec

(Continued from Page 39)

printer, full columns of characters are loaded into a shift register which controls the printing of the characters by the thermal heads, Perkin-Elmer noted.

Because the printer is fully buffered, the CRT can be available for communications with the host in less than 2 sec after the operator presses the CRT "print" key, the spokesman said.

The slew rate for blank lines is 5 ft/min, which enables normal page printing to be completed at a 20-sec maximum for a full page, he added.

The Model 650, which comes mounted in a 4- by 12- by 12-in. case weighs 15 pounds, costs $1,260 from Perkin-Elmer at 106 Apple St., Tinton Falls, N.J. 07724.

Printer System Fits Decsystem

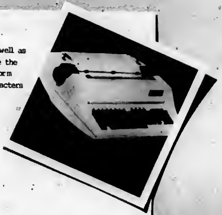
FORT LAUDERDALE, Fla. — Southern Systems, Inc. has introduced an I/O bus interface line printer system for the Digital Equipment Corp. Decsystem-10 that operates with printers from 600- to 1,500 line/min, according to a spokesman.

The S-10 system is capable of driving three printers simultaneously, the spokesman claimed. The interface itself does not require a separate installation rack and can be installed in unused space in the Decsystem, he noted.

No special programming is required with the S-10 and the unit is compatible with the DEC KA, KI and KL processor. It is also software-compatible with all operating systems, he said.

The S-10 system includes power supply, mounting brackets, printer, printer cables and an operations and maintenance guide. It sells for $22,850 with a 600 line/min printer and $41,385 with a 1,500 line/min printer, the spokesman said from 300 N.E. 30th Place, Fort Lauderdale, Fla. 33306.

Our terminal typed this page in 58 seconds.
Try it on any other terminal and compare the results.



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The **DTC-382** automatically types backwards as well as forwards. It analyzes carriage movement to minimize the motion required for carriage return, tabbing, line or form feed. Couple that with printing speeds up to 55 characters per second, and you increase throughput dramatically.

Notice how proportional spacing gives the page the look of a printed document.

And the **DTC-382** can also do:

Shadow printing **A B C D E F G H I**
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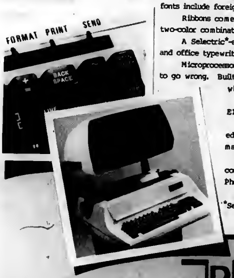
RELIABLE AND EXTREMELY EASY TO USE

A daisy-wheel printer gives you fast, quiet, trouble-free operation. To change from one type font to another, simply snap in a different daisy print wheel. Available fonts include foreign alphabets and APL.

Ribbons come in snap-in cartridges, fabric or carbon, in various two-color combinations.

A Selectric*-style keyboard makes switching between terminal and office typewriters a snap.

Microprocessor based construction means fewer components inside to go wrong. Built-in diagnostics help you isolate malfunctions when they do occur.



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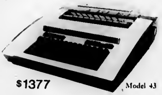

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For All your Mini Computer and Tele-Communication Needs

For Large Machines

CDC Tape Subsystems Bow

MINNEAPOLIS — A series of higher performance magnetic tape subsystems that record data at densities of up to 6,250 byte/in. has been announced by Control Data Corp.

The subsystems, encompassing CDC 677 and 679 tape transports and CDC 7021 controllers, are designed for use with the company's Cyber 70, 70 and 6000 series large-scale systems. They provide recording densities and data transfer rates up to four times the maximums previously available with the CDC 667 and 669 subsystems, the firm said.

Six 9-track models comprise the CDC 679 group of tape transports, which operate at speeds of 100, 150, or 200 in./sec. Three models are offered with either 800- or 600 bit/in. densities and NRZI or phase-encoded (PE) recording. The other three have 1,600 bit/in. PE recording or group coded recording (GCR) at a density of 6,250 byte/in.

The CDC 677 transports include three 7-track models that also operate at tape speeds of 100, 150 or 200 in./sec.

Other Features

Other features include internal data loop-checking capabilities and parallel connection of transports to controller so that individual drives can be switched off-line for maintenance without interrupting or affecting operations of the other drives.

Purchase price for the three 7-track transports are $17,500, $21,500 and $24,500. They lease for $416, $512 and $583 per month on a one-year contract and monthly maintenance costs $97, $102 and $133/month, respectively.

The six 9-track transports cost from $18,000 to $30,600, depending on speed, recording mode and density selected. One-year monthly lease prices range from $428 to $680, and maintenance is priced from $97 to $141 per month from Control Data Corp., Box O, Minneapolis, Minn. 55440.

Harris Offers 1600 Family Chain Printer

DALLAS — Harris Corp. has introduced a 1,200 line/min chain printer for its 1600 family of remote-batch terminals.

The Model 1654 features 132 or 136 print position/line, a selector for 6 or 8 line/in. and Ebcdic print chains having 0.095- and 0.079-in. fonts in various paired combinations of 48-, 64- and 96-char. sets.

The unit can be purchased for $65,200, which includes 132 print positions and one Ebcdic print chain. Monthly rental, including maintenance, is $1,490 on a five-year lease. Additional Ebcdic print chains cost $3,500 each.

First deliveries are scheduled for December from the Harris Corp., 11262 Indian Trail, P.O. Box 44076, Dallas, Texas 75234.

MBG-1 Bert Device Measures Tape Bit Errors

BILLERICA, Mass. — A device that provides selective measurements of bit error on magnetic tape systems in the frequency band time from 1 bit/sec to 50M bit/sec has been announced by Tau-Tron, Inc.

The MBG-1 Magnetic Media Bit Error Rate Technique (Bert) stresses magnetic tape recording systems by causing the magnetic tape media to exhibit failure modes.

Price of the MBG-1 is $10,600 from Tau-Tron, Inc., 11 Esquire Road, N. Billerica, Mass. 01862.

How to jump into key-to-disk, without giving up your

Granted, key-to-disk equipment does good things for data preparation in high-volume applications.

However.

This is one big jump that is best accompanied by a little foot-dragging. Because, in your enthusiasm for the things key-to-disk can do, you may forget what it can't do: read and punch cards.

And the punched card is still very much alive. Particularly as a turn-around document. But the useful unit record is also a pain in the processor for most key-to-disk systems. Leaving you with an awkward I/O problem, and possibly some dissatisfied using departments, too.

But what can you do? Hire, and train, two staffs of operators? One for keypunch, the other for key-to-disk? Double up on equipment? Establish two different work-flows?

Don't.

Instead, call us. Ask to see one of our key-to-disk-compatible interpreting data recorders. It works *with* your key-to-disk system to give you multi-media capability. You can use it for I/O. Or flip a switch and slip into off-line keypunch mode. Each unit combines keypunch, verify, interpret and reproduce functions so you can have a lot of scheduling flexibility without getting a lot of machines.

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DECISION DATA®
COMPUTER CORPORATION
makes computing cost less

Firm's Growth Spurs Switch to Mini

By Esther Surden
CW Staff

WINTER HAVEN, Fla. — When the energy crisis spurred tremendous growth for Unisul, Inc. here, the firm turned to an inhouse minicomputer and found that the system provided greater control over data, increased accuracy and better inventory control, according to Garry Hale, DP manager.

The manufacturer of insulation blowing equipment had used a service bureau for its accounting applications but found that the cost was prohibitive. President H.G. Woten decided to look at various small business systems to help solve the problems created by growth.

"We looked at the IBM 32, Burroughs B80, Qantel Corp. and DEC [Digital Equipment Corp.] machines but the one that impressed the owner of the business the most was one from Cincinnati Milacron (CM). It is such an old company and such a huge company that he felt the chances of its going out of business were far less than for some of the smaller firms," Hale said.

The company also had experience with CM through its machine shop, in which it used some CM tools, he noted.

Hale said Unisul "wasn't impressed with the IBM 32" at all.

"A lot of people in this area who had gotten 32s had gotten rid of them," he explained. Also, at the time of the search for a small system, the IBM 32 could not accommodate removable disk packs and was limited in storage size, he said.

Superior Results

"The system has proven to be superior to anything we could imagine," Hale commented.

The company did experience some software startup problems that Hale labeled minor. When Unisul first received its system, the payroll, ledger, receivables and payables application packages that came with it were in their infancy and had some bugs that needed ironing out, he said.

"This was CM's first attempt to write a complete package of programs," he added, "and it had problems because it was rushed to get the programs out to the users."

"I am a programmer and I went to CM's school and cleaned up about 85% to 90% of the problem myself. Since that time, CM has released new additions and has cleaned the packages up," he noted. The packages ran about 85% correct but there were some features the packages wouldn't perform, Hale stated.

From this experience, Hale has some advice to first-time users. Although a mini system probably doesn't need a full-time in-house programmer to watch over it, "it does need somebody who can kind of watch it whenever it has a problem." About 90% of the problems are just operator problems, and "you need someone who knows just a little bit more than the OEMs tend to make you think you need."

Also, having someone "on call" is a good idea, "because every now and then the firm might want to have some maintenance done on its programs. Companies are leaving themselves wide open for problems if they don't at least have a contract programmer in the area," Hale warned.

(Continued on Page 50)

Maintenance Overriding Reason For Series/1 Selection: Input

MENLO PARK, Calif. — The most important reason for selecting the IBM Series/1 over other minicomputers is IBM's "extensive maintenance capability," a survey of 40 Series/1 users indicated.

Conducted by Input, a California research organization, the study noted that other important reasons for the system's selection were its advanced architecture, a price/-performance ratio termed "excellent," the system's interrupt capabilities and the IBM name.

All of the users surveyed were pleased with their systems, Input reported.

Most of the 40 users were OEMs who demonstrated a lack of concern over the fact that IBM does not offer a quantity discount on the system, Input said.

Weaknesses in the system reported by the respondents include the lack of software and lack of a large-capacity disk drive. "However these 'weaknesses' are providing opportunities to software houses, peripheral manufacturers and system integrators to develop software packages and interfaces for the Series/1," the report continued.

Users located in large urban centers where third-party maintenance is available demonstrated more willingness to consider non-IBM peripherals for their Series/1 systems.

The 40 users had a total of 64 units installed and 755 on order and anticipated needing 3,132 additional units within five years.

Eight of the users were performing electronic funds transfer, paper mill control and energy management applications. The 16 users who were systems builders were developing new languages or generalized applications software or were building special systems.

The report costs $4,500. Input is at 2180 Sand Hill Road, Menlo Park, Calif. 94025.

Covering Your Assets

Computerworld will be featuring a special report in December to inform readers about the latest trends and tips on supplies and security.

What are the best, most efficient and least expensive methods to get the numerous supplies you need for your DP work? How do you protect your system from flood, fire or theft?

This is your opportunity to share ideas and experience by submitting an article of 1,200 words, or four to five double-spaced typewritten pages, by Nov. 7 to Ann Dooley, c/o Computerworld, 797 Washington St., Newton, Mass. 02160.

Ease-of-Use Features Urged

BOSTON — Manufacturers will have to place "continued emphasis on ease of use," not just for the computer professional but for the end user as well, according to Robert A. Yellowlees, division director of worldwide market requirements for IBM's General Systems Division.

Speaking to an audience at the Common small systems users group meeting here recently, Yellowlees said vendors will also have to be responsive enough to exploit new technology and deliver systems that suit the needs of a variety of users.

Advances in application program development that will ease design programming and maintenance demands on user resources are in the offing, he predicted, while at the same time, small systems must be designed with security and auditing in mind.

In addition, manufacturers are going to have to put continued stress on reliability, availability and serviceability of small systems.

"The problems we face in the future will not center on a lack of technology or lack of product offerings. The continuing challenge we face is achieving a clearer understanding of the needs of each business or organization and how we can channel the power of the computer to meet those demands," he concluded.

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Tom Price

A 200 System Development Manager, Tom is 34 and has 2 children. He is a graduate of Duke University (BSEE) with over 12 years experience in computer system development including 5 years in various management positions. His outstanding speciality is the application of mini-computers to realtime environment.

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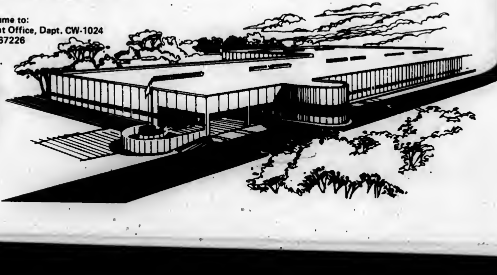

Distribution Control Handled by Turnkey

LONG BEACH, Calif. — An on-line distribution control turnkey system is available from Data Systems for Industry.

The system can be used for all aspects of order entry billing, the firm said, including inventory control at multiple locations, purchasing and cost distribution. Two-way teleprocessing with remote locations can be in either interactive or batch mode.

Based on the HP 1000 system, the turnkey unit's basic configuration can handle up to 75,000 inventory items with an average terminal response time of one second for transactions and inquiries, the company claimed.

The hardware includes 64K words of memory, a 50M-byte disk, a 300 line/min printer, a 1,600 bit/in. magnetic tape drive and two CRT terminals.

It can accommodate up to nine terminals. A dual-processor version handles 24 CRTs.

The basic system, including software and installation, costs $115,000, or $2,300 per month on a five-year lease. Remote job entry capability can be added for $6,000. Data Systems for Industry is located at 3450 E. Spring St., Long Beach, Calif. 90806.

PDP-11s Get Array Boards

NEWTON, Mass. — Computer Design and Applications, Inc. has unveiled a block floating point array signal processor for Digital Equipment Corp. PDP-11 minicomputers.

The MSP-3 is designed on two plug-in boards. It performs only the operation defined in its array library, a spokesman said.

Operations can be executed either by Fortran subroutine calls or by use of host-system I/O instructions under Assembly language. The boards are programmable read-only memory (Prom) driven, but can be reprogrammed by the vendor or the user to accommodate a change of application, he said.

Input data arrays reside in the host's memory and are read and operated on by the MSP-3, the company explained. The 2K words of block floating point memory are located in the MSP-3 for storage of intermediate results.

The unit costs $19,500, or $9,900 in quantities of 25 to 49, the company said from 375 Elliot Street, Newton, Mass. 02164.

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Firm Disposes of Paper Problem With Turnkey

GREAT NECK, N.Y. — Busse Hospital Disposables here tossed out a paper congestion problem when it put in a turnkey minicomputer system.

Busse, a 25-year-old-company with an annual volume of about $3 million in sales to the hospital market, has been using the system for more than two years.

"It took four persons to handle our business processing operations when we were doing $2 million a year, and the four were hard-pressed to keep up with the volume. Today, it takes three persons to handle $3 million in sales; and nobody's working under pressure," Emanuel Cardinale, vice-president, said.

Using a manual, ledger card-oriented NCR Corp. system, end-of-month closing for money took about a day and and a half, according to Busse's system supervisor, Margaret Brumfield. With the small system, Busse has an aged trial balance within three hours of closing and is ready to go on to the following month's orders, she noted.

Inventory control is a complex matter at Busse. The product line of hospital disposables includes about 150 finished items, but the component inventory ranges into the thousands.

For example, Busse's disposable sterile tracheostomy care set is a kit comprising 10 items, including the package.

Busse also has to keep track of inventory which is consigned to converters, as well as one product line which it manufactures in a Brooklyn, N.Y. plant. Shipping takes place from Busse's warehouse in Carlstadt, N.J., and from the manufacturing plant, in some cases, drop shipments are made by converters.

Processing of orders is handled by two CRT operators. Using the STC Systems, Inc. Ultimacc Standard Distributor System, Busse makes order entry the starting point for generation of order forms and billing.

The posting of open items for customer accounts, the updating of master files and the manipulation of information for management reports flow from the order entry procedure, Cardinale said.

Under the old system, he recalled, three persons were involved in preparing orders for one machine operator. First, the customer ledger card was pulled and the order attached; the order then went to the bookkeeper for a credit check.

After the order was returned for pricing and inventory control, the invoice was run through the machine. One of the clerks then had to type shipping labels and bills of lading, fill in the weight of the shipment and recalculate the billing extensions to make sure no errors had been made.

The ledger card system had been purchased three years earlier. "We thought it would meet our needs for six or seven years, but as our volume grew the system became less and less functional," Cardinale said.

Credit checking, another important benefit for Busse, helps keep track of the current status of 1,500 customers. "We never had an aged trial balance with our old system. Therefore, an inactive account could remain unpaid for a long time without necessarily attracting our attention.

"Of course, a new order would stimulate a demand for payment, but we couldn't rely on that to keep current. With Ultimacc, we have a much better handle on receivables," Cardinale said.

Slow Decision

The decision to acquire a minicomputer-based system was slow in coming. "The small businessman doesn't think in terms of a computer to solve this type of problem. Most of us believe computer systems are too sophisticated for such matters and far too expensive," Cardinale explained.

After being solicited by a sales representative and after seeing a system in operation at a business of similar size on Long Island, Busse hired a consultant to consider minis from STC, IBM Basic/Four and NCR. "With our consultant's help, we decided that Ultimacc was most appropriate for our needs," Cardinale said.

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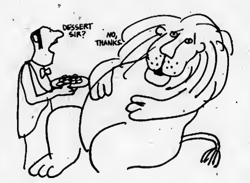

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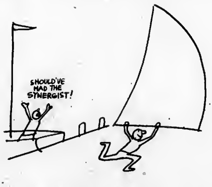
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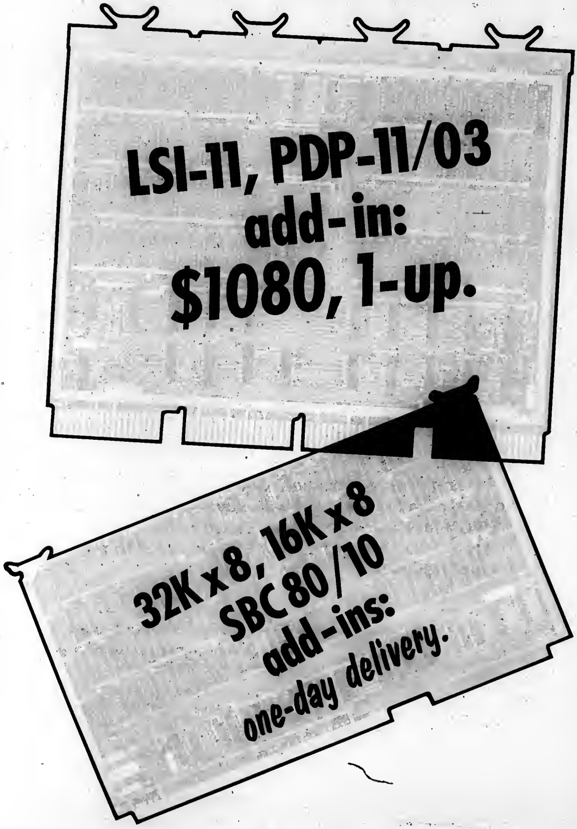

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MMS3400	32K x 18 or 64K x 9	For 3400N systems
MMS68102 MMS68102-1 MMS68102A MMS68102A-1	16K x 8 8K x 8 16K x 9 8K x 9	Battery backup for M6800 and other synchronous systems; pin compatible with EXORciser* micromodule
MMS68103 MMS68103-1 MMS68103A MMS68103A-1	16K x 8 8K x 8 16K x 9 8K x 9	Battery backup for M6800 and other synchronous systems; pin compatible with EXORciser* micromodule
MMS68104	16K x 8	For MEK6800D2 Kit
MMS80810 MMS80810-1	32K x 8 16K x 8	For 8080A-based systems; pin-compatible with SBC 80/10

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Who Decides on Mini Purchase? It Depends

By Esther Surden
CW Staff

Who makes the final purchasing decision when it comes to minicomputers?

In a recent CW survey, some of the answers to this question were:

The board of education, board of supervisors, top management, a partner, controller, DP department, city council, corporate officers, chief executive, executive committee, board of directors, auditing firm, president, systems department, vice-president of finance, hospital controller and engineering consultant.

You get the idea. There is no set final authority on minipurchases across various company and industry lines.

The choices of answers supplied in the survey were "end-user department, central purchasing department or central DP department," but for the majority of the 220 respondents these answers were far too simplistic. Of those users who did choose one of our supplied answers, most said the central DP department had the final say on buying a mini. Next most frequently listed was the end-user department.

For some, the decision to buy was very complicated. One user wrote that "the end-user department, within guidelines established by a central DP department and subject to implementation of controls in compliance with standards set by the central DP department and DP auditors," decided.

A user of 14 minicomputers scattered throughout the U.S. noted that the final decision about purchasing minis for his organization was made by end-user departments, although in some cases strong pressure was exerted by systems management for users to accept, even if the user was reluctant. This has "created user resentment at times. In at least one case, the system failed and the user sent the mini back," he reported.

Several users were in the process of switching from a situation in which the final decision was made by an end-user department or division to one in which control is centralized. An MIS director of a large toy corporation described a firm whose "autonomous companies bought the wrong computer." Confronted with a grab bag of different gear, the company has since centralized purchasing control under the DP department.

Growth Spurs Switch

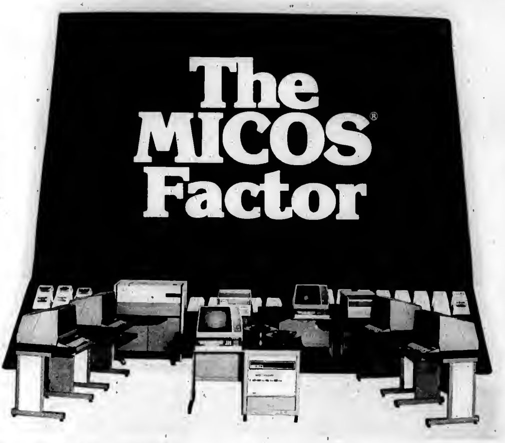
(Continued from Page 43)

Hardware at Unisul includes the CM 2000 CPU with 64K of MOS memory. It's a multiprogramming system with foreground/background partitioning. The system has three CRTs, one Dataproducts Corp. 300 line/min printer and two 5M-byte Iomec disk drives.

"This is the same configuration a lot of the mini [makers] are using. They are building their own CPUs and using other people's drives," he said.

The CPU was originally designed as a controller for the CM machine tools, Hale explained, so it can work in even the worst environments.

Beside the regular accounting functions, the system is running an inventory package designed by the firm. The package explodes all the parts necessary to build the insulation blowing machines and forecasts how many parts will be needed and when.



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More 'Giant Steps' in Store

Micro World Seeing Dramatic Changes

By Phil Roybal
Special to CW

The world of personal computing has taken some giant steps since the first Mits, Inc. Altair system made its debut. In less than three years it has progressed from crude hardware kits to completely integrated, high-level language systems sold ready-to-run by mass retailers. Hardware prices have also changed dramatically.

Back in 1976, when most customers were still engineers, a user buying a Basic language system with a CRT terminal and tape cassette storage would have to spend about $2,300. While rumors hinted of machines like Processor Technology, Inc.'s SOL System that would cut system prices, in the spring of this year, industry watchers were anticipating only that a $1,200 personal computer might appear by year's end.

Then along came Commodore's PET at $495 (later raised to $595), a ready-to-run system with peripherals built in. It represented a significant breakthrough by demonstrating interest from a major manufacturer and system prices within the consumer range.

Now, with competition from Tandy Corp., Apple Computer and Heath, Inc., system capabilities are exploding as average prices drop sharply.

The driving forces in the world of personal computing are the emphasis on high-level languages, more sophisticated output devices and lower system costs. These factors put a premium on:

- Large memories — because language translators take a lot of memory themselves and their use encourages the creation of larger programs.
- Processor performance — because interpretive languages are relatively slow and need all of the processor horsepower they can to handle many video graphics and game applications.
- Interfaces — because sophisticated interfaces can cut the cost of peripherals.

Change Shaping Up

From a semiconductor point of view, here is how changes will most likely shape up in each of these three areas.

Looking at microprocessor units (MPUs), the 8080A is today's biggest seller in the personal computing area, with the Z80 moving up rapidly. However, Commodore's market entry may make the 6502 the volume leader.

But already, the industry is moving up toward the 16-bit MPUs. Several vendors offer 16-bit systems and there will be others within a year.

Of the 16-bit systems, those that are software-compatible with existing minicomputer families offer the most for the software-minded, because they allow the user to tap the extensive libraries already available for their big brothers. Such 16-bit systems will generally offer speed and memory efficiency advantages over the 8-bit systems; and as they become more popular,

(Continued on Page 54)

Micros Seen Brain Developers

By Catherine Arnst
CW Staff

WASHINGTON, D.C. — The advent of the personal computer signifies the first time a tool has been developed to expand the brain instead of the muscle, Dr. Portia Isaacson, professor of mathematical science at the University of Texas, said at the Data Processing Management Association (DPMA) conference here recently.

Personal computing is the most significant of all technology-based revolutions, even more so than the printing press, Isaacson said. Its growth will result in millions of sales in the very near future, she added.

There are already more than 300 computer hobbyist clubs in this country, and the one in Dallas has two meetings a month with attendance levels of over 100. "Unfortunately, DPMA, ACM and IEEE don't draw as well," she said.

The computer hobbyist is now involved in "the elite of hobbies . . . Most have serious applications," she said. However, personal computing is not only a hobby.

Store Owner

Isaacson is coowner of a computer store and stated that only 20% of sales are made to hobbyists — the others are made to businesses who use the inexpensive microprocessors for their DP needs.

These computers are replacing timesharing and minicomputers for the small business, Isaacson said, because they represent the lowest cost computing.

The typical small business computer has 32K bytes of storage, a hard-copy terminal and dual floppy disks. "The personal computer is not small, it's just cheap," she said.

The language used is Basic, but with many variations. "People are willing to program in any language you give them as long as you just call it Basic," Isaacson continued.

The other large appeal for personal computers is home computing (as opposed to business and hobbyists), which would mean a personal computer in an integrated package, costing $600 to $900 and having enormous program libraries, she said.

The two main uses of home computing will

(Continued on Page 52)

Naked Mini to be Retailed

IRVINE, Calif. — Computer Automation's Naked Mini minicomputers will be sold in retail stores for the first time beginning this month through a new computer store operation of Tandy Corp. of Fort Worth, Texas, operators of the National Radio Shack chain.

Users will be able to purchase the first retailed Naked Minis when the first Tandy Computer Store opens in Fort Worth this month, according to a Computer Automation spokesman.

The minis will be sold over the counter in small business-oriented systems packaged by Tandy or as stand-alone units that professionals or hobbyists will be able to incorporate into their own systems, the spokesman said. The Computer Automation products will also be incorporated into the Tandy catalog for mail order sales.

The system package by Tandy will include Computer Automation's distributed I/O system — using intelligent cables that enable the minis to work with virtually any peripheral device, the spokesman claimed. The systems will also work with floppy disk controllers, operating systems and both the Fortran and Basic languages, he added.

Applications programs for the small business systems will be supplied by Tandy, which will also supply customer service.

The Naked Mini LSI 4/10 minicomputers to be offered by Tandy are general-purpose, 16-bit systems with 4K-, 8K-, or 12K-words of storage expandable to 64K words.

The Naked Mini is so-called because it was originally conceived as a low-cost computer on a circuit board that could be designed into a system as a component, the spokesman explained, noting that the firm's systems are also available fully packaged, with chassis, power supply and control panel.

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OPPORTUNITY FOR BUSINESS MICROCOMPUTER DEALERSHIPS. California Microcomputer Company's (CMC) previous ads in Computerworld has resulted in several established dealerships. If you are interested in a CMC Dealership for a small business microcomputer system that includes CPA approved business software, call or write us. 1 year free software releases to customers. Complete leasing and maintenance plan available to dealers. California Microcomputer Company Post Office Box 3199 Chico, CA 95927 (916) 691-1420.

Keyboard Permits Tailoring, Features Alpha Lock Key

WAUKEGAN, Ill. — A keyboard designed for the personal computer and hobbyist user who doesn't want to work around a totally dedicated unit has been introduced by the Cherry Electrical Products Corp.

Designated the "Pro," the keyboard features an alpha lock key that changes output from typewriter to teletypewriter code and five unassigned relegendable keys. The keyboard can piggyback a "daughter" board easily, a spokesman claimed, noting the device can be customized by the user.

Among the keyboard's standard features are a full 67-key array including five user-definable, unassigned and relegendable keys; 128-character Ascii output; four modes (lower case, upper case, control case and teletypewriter alpha lock configuration); transistor-transistor logic (TTL) and (DTL)-compatible output circuitry; and a single power supply voltage of 5V.

The keyboard lists at $135. Charts, diagrams and detailed specifications are available from F. Amendola, c/o Cherry Electrical Products Corp., P.O. Box 718, Waukegan, Ill. 60085.

Micros Seen Brain Tools

(Continued from Page 51)

be entertainment — "in a really new form that is intellectually challenging" — and education.

With a home computer, one could simulate the stock market, do sophisticated astrological analyses, play "Star Trek" (a computer game) all you want; run a computer dating service, learn to write programs, start a biorhythm business, project personal finances, chart the family geneology, keep a stamp collection inventory, control model railroads and hundreds of other applications, Isaacson conjectured.

Personal computing will eventually change the computer industry, she said. There will be a loss of control by DP centers of computing, it will replace time-sharing and computer education will be common, Isaacson added.

Elitism Waning

"Now we (DP personnel) are in an elite group, but soon being in computers will be like being in stereos."

But most important, "computer inventiveness will be in the public domain," she said. Whereas previously only large universities and corporations did research and development, now everyone can afford to experiment, she said.

MICROCOMPUTING CLASSIFIED EXCHANGE

This special classified section in solid (non-display) format is designed for people who are working with or interested in microcomputing. Through it, you can buy, sell or swap equipment software or services; contact people with similar interests; start clubs; disseminate information; look for game partners; or send messages to other individuals. As the number of ads increases, this section becomes more useful; so we've tried to make ad placement as simple and inexpensive as possible. Details are as follows:

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absolute address — 1. An actual location in storage of a particular unit of data; address that the control unit can interpret directly. 2. The label assigned by the engineer to a particular storage area in the computer. 3. A pattern of characters that identifies a unique storage location or device without further modification (Synonymous with machine address.)

accumulator (AC) — The accumulator is a 4-, 8-, 12- or 16-bit register that functions as a holding register for arithmetic, logical and input/output operations. Data words may be fetched from memory to the AC or from the AC into memory. Arithmetic and logical operations involve two operands, one held in the AC, the other fetched from memory. The result of an operation is retained in the AC. The AC may be cleared, complemented, tested, incremented or rotated under program control. The AC also serves as an input/output register. Programmed data transfers pass through the AC.

adapter — A connective device designed to affect operative capability between different parts of one or more systems and/or subsystems.

adapter plug — Refers to a fitting designed to change the terminal arrangement of a jack, socket or other receptacle so that other than the original electrical connections are possible.

A/D analog-digital converter — Circuit used to convert information in analog form into digitial form (or vice versa), e.g., in a digital voltmeter.

address — 1. A character or group of characters that identifies a register, a particular part of storage or some other data source or destination. 2. To refer to a device or an item of data by its address.

addresses, memory — Every word in memory has a unique address. A word may be defined as a set of bits comprising the largest addressable unit of information in a programmable memory. The address of a word is its location in memory.

add time (in microseconds) — The time required to acquire from memory and execute one fixed-point add instruction using all features such as overlapped memory banks , instruction look-ahead and parallel execution. The add is either from one full word in memory to a register or from memory to memory, but not from register to register.

Algol — One of the international program languages designed for the concise, efficient expression of arithmetic and logical processes and the control (iterative,etc.) of these processes. Taken from Algorithmic Language.

algorithm — A prescribed set of well-defined rules or processes for the solution of a problem in a finite number of steps, for example, a full statement of an arithmetic procedure for evaluating sin x to a stated precision. Contrast with heuristic.

From Microcomputer Dictionary & Guide by C. J. Sippl and D. A. Kidd Used with permission of Matrix Publishers, Inc., 207 Kenyon Road, Champagne, Ill. 61820.

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More Dramatic Changes in Store for Micros

(Continued from Page 51)

they will be the frontrunners for new software developments.

But there is more to come. Mark Shepherd, Jr., chairman and chief executive officer of Texas Instruments, has predicted the arrival of single-chip, 32-bit microcomputers with 1M bits of on-board memory by the early 1980s. The processing power inherent in such systems staggers the mind.

Perhaps the advance most likely to stir the imaginations of personal computer fans is the introduction of high-level language MPUs, which need no compilers or interpreters because they directly execute high-level code. Such machines could be on the market within a year, from at least two different sources.

They are the ultimate in speed and memory efficiency for high-level language enthusiasts, at the price of being hardware-bound by someone's idea of the best "all-around" language. It will be up to the user to decide if the performance advantages are worth this price.

These processor developments will be of great importance to potential customers, because:

- The processor's speed, instruction set and architecture determine the bounds of systems performance; and
- The processor's instruction set limits the choice of available software. It is usually difficult to later upgrade the system processor without losing the user's software investment.

Memories account for between 25% and 75% of a system's cost, so advances in density and production yields are important to users as their systems grow.

Most systems today rely upon 1K (static) or 4K (static or dynamic) random-access memory (RAM) chips, with a few advanced designs using the newer 16K dynamic RAMs. Boards made from the older devices are selling for less than .3 cents per bit. As 16K dynamic RAMs come into full production over the next year, improvements in process knowledge, memory cell size, wafer size and mask lithography techniques will allow the industry to cut the user costs dramatically with these denser memory devices.

The read-only memory (ROM) content of personal computer systems will rise substantially from today's average of 1K byte per system to 16K bytes per system in the early 1980s. This is a consequence of greater emphasis upon high-level language firmware and the price differences between ROM and RAM (more than 2:1 at present), which favor using ROMs if the programs don't have to be changed.

Future personal computer users can expect systems with complete language processors and monitor firmware contained in ROM. Instead of switch flipping and bootstrapping their electronic genies into life, the users will be able to "plug in, turn on and run."

Most memory developments will benefit today's users and future buyers in that system memories can be inexpensively expanded.

Interface devices will account for more of the cost of personal computer systems as processors become powerful enough to handle complex peripheral devices.

Developments in this area will allow users to expand existing systems at lower cost, rather than making those systems obsolete. The devices most likely to impact the user within the next two years include: speech and music synthesizer devices, dual-density floppy disk interfaces, CRT/-light pen interfaces for alphanumerics and static graphics, phone dialers, modems and color graphics interfaces.

The personal computer industry is presently about where the calculator industry was in the early '70s. Advanced products existed in the labs somewhere, but neither the manufacturers nor the public yet realized the multimillion-unit volume potential of the market; nor the price reductions that advances in technology would bring. And, just as calculator prices have dropped dramatically since then, so will the prices of personal computers drop as the market climbs to more than $1 billion by 1981.

Is this the time to buy a computer, or should one wait?

I plan to buy this year. I will get the most powerful processor available, since this will determine the ultimate capacity of my system. I will plan for future expansion of memory and peripherals as prices drop and new devices become available.

While I'm sure that any given system's market price will soon drop dramatically, I can do an awful lot of problem solving while others wait for the "ultimate" system to appear.

Roybal is the business manager for personal computer components with National Semiconductor in Santa Clara, Calif.

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TI Makes 'Off-the-Job' Offer

DALLAS — Texas Instruments, Inc., has extended the problem-solving power of its programmable calculators for off-the-job enjoyment by introducing a library of solid-state software programs.

The Leisure Program Library for the TI Programmable 58 and 59 calculators contains 20 different programs for golfers, bowlers, chess players, football fans, bridge players, photographers and others interested in using the calculator for entertainment.

Golf Uses

Golfers, for instance, can use the library to save time when figuring United States Golfers Association (USGA) handicaps; bowlers can keep score for up to 90 players who are bowling simultaneously.

Other programs can calculate biorhythms, land a spacecraft safely on Mars, simulate sea battles and play blackjack, Acey-Deucy, Craps, Nim and other games.

Expires Next Week

The plug-in program library module and manual is available free to purchasers of TI 58 or 59 calculators who mail their customer information card and dated proof of purchase showing the calculator's serial number before Oct. 31 to Leisure Library Offer, P.O. Box 53, Lubbock, Texas 79408.

After Oct. 31, the library will be available at a retail price of $35.

For Next 12 Months

Micro Shows on the Way

Trying to figure out how to schedule vacation time and money to take in a hobby computer show or two can be a trying affair. And it often seems like everyone else knows about the big shows, but the information never passes your way.

As a reader service, *Computerworld* will publish a regular listing of known microcomputer shows. Included in the listing will be the name of the show, date, location and the name and address to contact for further information.

1977 Shows

Oct. 27-29, Chicago — **'77 Midwest Personal Computing Show.** Contact: Louise Garcia, Personal Computing Magazine, Suite G, 401 Louisiana, Albuquerque, N.M. 87108.

Oct. 28-30, New York — **Personal Computing Exposition.** Contact: Ralph Ianuzzi, H.A. Bruna & Associates, 78 E. 56th St., New York, N.Y. 10022.

Nov. 8-10, Toronto — **Personal Computing Showplace.** Contact: Derek A. Kidd, Industrial & Trade Shows of Canada, 481 University Ave., Toronto, Ont. M5W 1A7, Canada.

Nov. 28, Gaithersburg, Md. — **Personal Computing.** Contact: National Bureau of Standards, Gaithersburg, Md.

1978 Shows

Feb. 27-March 1, Philadelphia — **1978 Business and Personal Computing Sale and Exposition.** Contact: Produx 2000, Inc., Convention Services Department, Roosevelt Blvd. & Mascher St., Philadelphia, Penn. 19120.

March 3-5, San Jose, Calif. — **Second West Coast Computer Faire.** Contact: Jim Warren, The Computer Faire, P.O. Box 1579, Palo Alto, Calif. 94302.

April 28-30, Long Beach, Calif. — **Percomp '78** Contact: James H. Lindwedel, Royal Exposition Management, No. 108, 1833 E. 17th, Santa Ana, Calif. 92701.

June 5-8, Anaheim, Calif. — **National Computer Conference & Computer Festival.** Contact: Steve Miller Stanford Research Institute, 333 Ravenswood, Menlo Park, Calif. 94025.

July 23-25, Detroit — **Macc Computerfest '78.** Contact: Jim Rarus, Semco, Box 9578 North End Station, Detroit, Mich. 48201.

Aug. 25-27. Atlantic City — **Personal Computing '78** Contact: John Dilks, Rt. 1, Box 242, Mays Landing, N.J.

Oct. 27-29, Los Angeles — **Third West Coast Computer Faire.** Contact: Jim Warren, The Computer Faire, P.O. Box 1579, Palo Alto, Calif. 94302.

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Xycon Allows Multiple MPU Master/Slaves

HAYWARD, Calif. — Computer Systems Unlimited has introduced the Xycon III microcomputer, which reportedly has features that enable the use of 8- or 16-bit modules and can use multiple microprocessor units (MPU) on a master/slave basis.

Each system is fully assembled and tested, then "burnt-in" for an extended period of time to assure immediate and continuous operation.

The Xycon III system software consists of an auto boot, a read-only memory (ROM) supervisor, an assembler and a text editor. Also available are Disk Basic and Fortran IV Compiler.

The basic microcomputer costs $4,200, which includes 16K; complete systems begin at $7,500. More information can be obtained from Computer Systems Unlimited, 25903 Peterman Ave., Hayward, Calif. 94545.

Store Opens in N.J.

RAMSEY, N.J. — The Typetronic Computer Store at 806 Route 17 here opened for business Oct. 17.

Burroughs, NCR, CDC and IBM

Mainframers Set Nine-Month Records

By E. Drake Lundell Jr.
CW Staff

Mainframe computer companies appear headed for a top-flight year as Burroughs Corp., NCR Corp., Control Data Corp. and IBM all reported record revenues and earnings for the first nine months of 1977.

At IBM, earnings increased 18% while revenues jumped 16% during the third quarter compared with the same period last year. In total, the firm increased its earnings by 12% on a revenue hike of 11% during this year's nine-month period.

At Burroughs, the third-quarter earnings rise amounted to 16% on a 11% hike in revenues, but for the nine-month period the firm posted a higher performance, showing a 17% increase in profits on a 10% revenue increase.

NCR did even better in terms of percentages, racking up a 33% earnings increase in the third quarter and 48% growth for the first three quarters of the year. Revenues increased only 6% in the quarter and 9% for the year, however.

CDC reported a 15% improvement in nine-month earnings and third-quarter results that were 7% better than those of the same period last year.

The chief executives of each firm had varying reasons for the increases.

At IBM, Frank T. Cary, chairman, said an increase in outright sales caused the jumps. The sales of equipment, as opposed to leases or rentals, set a record for any quarter in the company's history, he noted.

During the third quarter outright sales for the company as a whole totaled $1.85 billion compared with $1.37 billion in the same span a year ago.

Rental and service income, on the other hand, rose only 5.7% and was under the level set in the second quarter of this year.

At Burroughs, Chairman Ray W. Macdonald said the good showing in the third quarter proved the firm could weather price cuts.

In an interview with the *Wall Street Journal,* Macdonald recalled that when IBM began cutting prices earlier this year, many observers wondered if the other firms in the business would be able to continue growing.

The records at NCR, according to William S. Anderson, chairman, are attributable to the firm's ability to improve profit margins both on equipment and services.

At CDC, data services were particularly strong in the third quarter, recording a 21% gain in revenues over the same quarter a year ago, according to Chairman William C. Norris.

However, results were also boosted by "a higher than anticipated level of purchase conversions of previously installed equipment" and good demand for the firm's largest systems.

In addition, all of the chief executives predicted — or at least implied — that the growth would continue.

IBM does not make predictions on the future, but Cary did indicate that "incoming orders" continue at a high level and that such orders are running ahead of the orders in the same period a year ago.

At NCR, Anderson said that firm expects fourth-quarter earnings to surpass last year's, which would push the firm to an overall record year.

Macdonald also predicted that Burroughs will set earnings and revenue records for the year, but he declined to predict specific figures for the fourth quarter or the year.

In the raw numbers, the four firms stacked up this way:

IBM earned $690.4 million or $4.66 a share on revenues of $4.59 billion during the third quarter, compared with $586.9 million or $3.90 a share on revenues of $3.96 billion a year earlier.

(Continued on Page 59)

I-8100 Called 'Cornerstone' for NCR

By Esther Surden
CW Staff

DAYTON, Ohio — NCR has "learned to charge for everything like our big brother" does, chairman William S. Anderson said here recently during festivities that heralded the firm's I-8100 series of small business computers.

The remark was his way of explaining the firm's reason for unbundling operating system software, application programs, education and documentation offered with the new systems aimed at first-time users [CW, Oct. 17].

The I-8100 systems are frankly targeted at replacing "countless thousands of accounting machines and accounting computers currently in use throughout the world," a large number of which are used by current NCR customers. Anderson described the I-1800 as a "cornerstone in NCR's strategy" to make inroads into this marketplace.

The 499 user will not be able to migrate into this system, he continued.

The I-8100 is significant in that it has a "price comparable to that of an accounting computer" and offers "upward migration into larger systems," he said.

NCR president Charles E. Exley readily admitted that there was nothing startling or technologically innovative about the products announced. The systems are, however, important to NCR because the potential market for small business systems is "huge" and "the strongest trend in small systems today is the trend toward interactive processing," he added.

The small systems are upwardly compatible with the larger systems in NCR's line, Anderson noted, adding that the firm's concentration on the small system does not indicate "the era of the large computer has passed," but rather "the era of the small computer has arrived." NCR remains committed to large-scale users and will introduce two new large-scale systems in the 8000 line later in the year, he said.

Market Targets

The I-8100 will be marketed to manufacturing companies, wholesale/distribution firms, financial institutions, retail stores, hospitals, schools and government users, Exley stated. "There are in this country alone more than 80,000 small manufacturing firms that have between 10 and 150 employees. The vast majority of systems currently in use by these companies are rudimentary," he noted.

"The price of EDP equipment is a critical factor" for most of the small companies and for the most part, these companies have neither the desire nor the expertise to install electronic systems. NCR, Exley continued, is providing a system that offers ease of installation and use at a price the company feels these businesses can afford.

NCR sees the Burroughs B80, IBM 32 and 34 and Univac BC/7 as the biggest competitors for the system. The B80 runs under a batch update operation, a spokesman noted. In comparison with the IBM 34, interactive industry application packages for the I-8100 will be available shortly as opposed to IBM's long lead time on products, the spokesman added.

The system is user-installable with very little help from NCR and the "lower the installation cost, the higher the profit margin despite unbundling," he continued.

Designing the I-8100 with a team system programming development approach produced this system that can be installed "with virtually no support from the vendor." Team members included an industry specialist, interactive specialist and education and documentation specialists.

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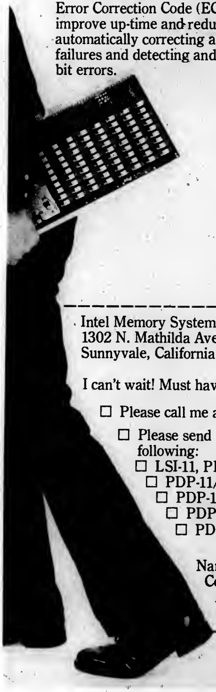

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CI Notes

CCIA Members Plan Conference

BEVERLY HILLS, Calif. — The Computer & Communications Industry Association (CCIA) will hold a membership meeting here on Nov. 15-16 at the Beverly Wilshire Hotel.

The program will feature a presentation by Peter Cunningham, president of the market research firm Input, who will present scenarios and forecasts in such areas as IBM-compatible mainframes, firmware, value-added networks and software developments.

In addition to that presentation, Billy Oliver, vice-president for engineering planning at AT&T's Long Lines Department, will discuss "The Evolving Bell System" and a panel will cover the possible effects of President Carter's tax reform proposals on small and medium-sized businesses.

Information is available from the CCIA at Suite 512, 1500 Wilson Blvd., Arlington, Va. 22209.

Stockholders to Decide HIS, Incoterm Match

MINNEAPOLIS — Incoterm Corp. will be merged into Honeywell Information Systems, Inc. if a stock deal worked out by the two companies is approved by the stockholders of Incoterm.

The transaction calls for the 2.1 million outstanding shares of Incoterm stock to be converted into Honeywell stock at the rate of one Incoterm share for .42 shares of Honeywell.

The ratio assumes the average price of the Honeywell stock will be in the $40 to $50 range during a 10-day period before the proxy material is distributed to Incoterm shareholders.

If the Honeywell stock increases, fewer shares would be exchanged, but if it decreases the number of shares exchanged would go up.

However, if the Honeywell stock goes over $60 or under $35 per share during the period before the merger is complete then the two firms would go back to the drawing boards on the agreement.

The transaction will be structured as a nontaxable corporate reorganization, HIS said.

CDC Begins Delivering 9380 to Macro

MINNEAPOLIS — Control Data Corp. said it has begun deliveries of its 9380 line of OEM printers to the Printer Sales Co. Division of Macro Products Corp., Long Beach, Calif.

The deliveries are part of a three-year contract valued at about $3.5 million for the 300-, 600- and 900 line/min band printers that optionally print 15 char./in.

The contract represents the first agreement that combines CDC product deliveries with its equipment maintenance and peripheral financing services, CDC said.

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Mainframers Post Records

(Continued from Page 57)

For the first nine months, IBM earned $1.92 billion or $12.92 a share on revenues of $13.1 billion compared with earnings of $1.72 billion or $11.47 a share on revenues of $11.79 billion in the year-ago period.

Burroughs earned $43.2 million or $1.06 a share in the third quarter and $121.1 million or $2.99 a share in the nine-month period. Revenues were $490.3 million and $1.45 billion respectively.

This compared with year-ago earnings of $37.2 million or 92 cents a share in the quarter and $103.9 million or $2.58 a share in the first three quarters. Revenues were $443.2 million in the 1976 quarter and $1.31 billion in the nine-month period that year.

At NCR, the third-quarter net totaled $33 million or $1.18 a share compared with $25 million or 93 cents a share a year ago. Revenues increased from $569.5 million in last year's quarter to $604.2 million this year.

For the entire nine months, the firm earned $84.3 million or $3.02 a share on revenues of $1.75 billion compared with the year-earlier figures of $56.8 million or $2.19 a share on revenues of $1.6 billion.

CDC reported net earnings of $16 million or 93 cents a share for the third quarter compared with $15 million or 87 cents a share in the 1976 quarter.

For the nine months, earnings totaled $42.3 million or $2.45 a share compared with $36.7 million or $2.12 a share in the first three quarters of 1976. Revenues were $373 million and $1.1 billion respectively.

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Software to Play Strong Role

Net From General-Purpose CPUs to Rise: ADL

By Molly Upton
CW Staff

NEW YORK — Profitability from sales of general-purpose computers should increase over the next five years as a result of decreased manufacturing costs and additional revenues from unbundled systems programs, according to a five-year forecast report from Arthur D. Little, Inc. (ADL), a research and consulting firm in Cambridge, Mass.

Systems software should produce "several hundred million dollars/year of incremental revenues," ADL stated in the report, which was introduced as evidence in the U.S. vs. IBM antitrust trial here.

The net value of U.S. general-purpose computer shipments — or shipments less returns — should go from $6 billion in 1976 to either about $4.3 billion or a little over $6 billion in 1981, the report forecast.

Gross shipments are projected to rise from about $7.7 billion in 1976 to between $8 billion and $10 billion in 1981. A peak should occur in 1978 and the lowest point be reached in 1979, when a recession is expected.

Most Makers Constant

IBM's market share should grow to between 67% and 70% of the worldwide installed based compared with its 66.9% in 1976, according to the report.

Univac's share could drop from 8.4% to between 6% and 7% in 1981. However, the report noted, after 1981 it could well rise again, reflecting the firm's tendency to introduce its products late in the industry product cycle.

Other makers' shares should remain relatively constant, according to the report.

IBM Trial Documents

Honeywell Information Systems may be in a good position to increase its market share because of its strong position in such high growth markets as Europe and Japan, ADL indicated.

But HIS' potential for significant profit increase is hampered by the high costs it incurs by supporting multiple product lines, the report continued. Digital Equipment Corp.'s market share is more likely to remain the same than grow because of the intensifying competition, including IBM, in the OEM mini arena.

Also, the other large manufacturers are "steadily improving their offerings in Digital Equipment's end-user market areas," ADL said.

Control Data Corp. may experience some erosion of market share from 3.3% to between 2% and 3% as a result of "heavy competition and a limited potential market" for large scientific machines, according to the report. NCR may be able to maintain or increase its 1976 share of 2.3%.

Both these firms "should find their present positions viable throughout the period," ADL stated.

The report assumes a real growth in the gross national product of 3.5%/year in the U.S., 3%/year in Europe and 5% in Japan. It also expects a recession during the 1978-79 period and assumes an inflation rate averaging 4% to 5%/year throughout the period.

No Radical Changes

The concept of distributed minicomputer networks is not going to radically change the entire structure of the data processing industry, ADL contended.

The general-purpose system will "hold its own fairly well, however, until network systems programs are available for handling complex applications in a transparent, integrated manner," the report stated. Suitable systems programs may be five-years away, it added.

Shipments of medium computers have been more sensitive to the economy than the small units, the report observed. "Shipments of medium-priced machines will increase substantially in 1977," reflecting a wave of new product deliveries, ADL stated.

The growth will flatten out in 1979, reflecting the anticipated recession and temporary saturation of demand.

The ADL estimates for medium-priced machines ranged from about $2 million to $2.4 billion in 1977 to either $2.3 million or $3 billion in 1981. The sharp growth in the last two years will reflect their use with a new generation of giant machines and also with electronic funds transfer.

A downturn in large system shipments should occur in 1979, reflecting saturation in demand and the recession, ADL said. Shipments should then level off as they face competition from the giant computers.

In 1977, shipments of large systems should be between $1.2 billion and $1.5 billion, jumping to between $1.4 billion and $1.7 billion in 1978. They will then decline by about $500 million in 1979 and then level off at either under $1 billion or about $1.3 billion, according to the study.

IBM 3033 Forecast

ADL foresaw the 3033. The report said IBM would announce a "major new generation" of giant computers early this year which would contribute to a sizable downturn in 1977 giant computer shipments while users evaluated the newcomer(s).

Shipments of giant computers, which exceeded $2 billion in 1976, should dip to between $1.2 billion and $1.5 billion in 1977 and then recover in 1978 to between $1.8 billion and $2.2 billion, ADL estimated.

Flat Year

The following year will be flat, according to the ADL study, but after 1979 shipments should grow to between $2.4 billion and $3 billion by 1981.

Since many of the products will be modular, ADL expects few older units will be returned.

Probably toward the end of the period, ADL forecast, IBM will counter competition with a new operating system. "Most of its subordinate functions will have been separated out into dedicated supporting processors so that only the central scheduler, resource assigner and error manager will need to be changed," the report said.

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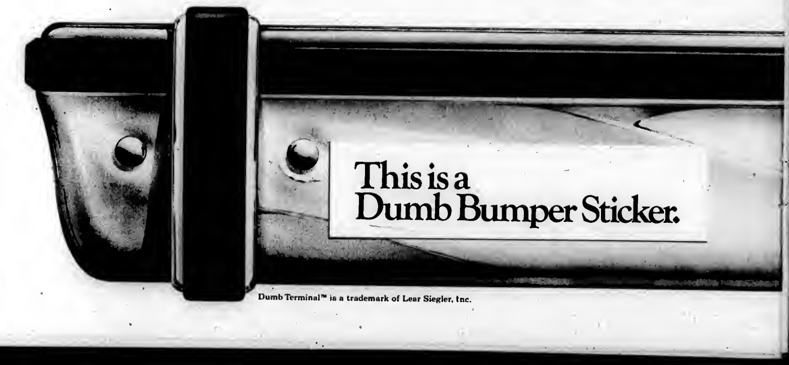

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Norris: DP Can Aid Society — And Vice Versa

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Data services can become a driving force behind comprehensive solutions to social problems "because they offer availability and flexibility with little or no capital equipment investment by the user," according to William C. Norris.

But the companies providing these services must learn to respond to changing needs, Control Data Corp.'s chairman of the board and chief executive said at a conference here recently.

"More and more those needs are to find solutions to society's major problems as opposed to simply providing a service — and more important for us as businessmen is to turn those solutions into business opportunities," Norris stated.

"Widespread cooperation is essential to that task," he added. "It is also the means not only for the survival of many individual data service companies, but ultimately of our present business system."

Business cannot leave major societal problems unsolved for long, Norris contended. "If it does, society will turn elsewhere for solutions. Therefore, the entire private enterprise system is at stake, he added.

Companies Dwindling

To bring his message a little closer to home, Norris pointed out that between 1965 and 1968 there were approximately 2,000 small data services companies. Today, that number is estimated at 1,400 and by the early 1980s, unless the trend is stopped, it is expected to dwindle to about 800.

The answer is for small data services companies to develop wide-based cooperation among themselves and with large companies and to move toward comprehensive solutions," Norris maintained. This type of business strategy requires more resources, but these can be obtained by sharing facilities and by technological cooperation. This will ultimately reduce needless duplication of effort, he said.

CDC is now using data services and joint ventures to try to improve productivity and quality in education, in management of technology and in health care, he noted, adding all three social needs represent business opportunities.

Educational Projects

Citing CDC's 14-year-old effort with the University of Illinois and the National Science Foundation to develop computer-based education to the point where it would be cost-effective for training in both industry and selected vocational and remedial courses, Norris said that CDC now has 29 learning centers located throughout the U.S.

By the end of this year, the company will have placed 45 to 50 learning centers in cities across the country, he added. While most courses offered at the centers are now primarily aimed at business, courses in basic skills through a ninth-grade level will be available by December.

"As computer-based education becomes cost-effective for virtually all kinds of education and training, there will be business opportunities for all sizes of service companies," Norris maintained. "Small companies can gain the necessary resources through cooperation with others in sharing equipment and through joint development of courseware."

In the area of technology management, CDC has established Technotec, a computer-based system for communicating the availability of and the needs for various technologies.

Because many technologies are complex and consulting assistance by specialists is required, the corporation has developed a related service, Worldtech, which is an organization of technical, marketing and financial experts willing to assist in all phases of technology transfer, Norris added.

"The approach for data services companies in serving the needs for more efficient management of technology is to assemble the resources necessary to seek out technology for clients and to help in expediting its transfer and application," he stated. "this will require both data services and engineering professionals. Equipment and communications networks can be shared to reduce capital requirements."

Health Care

The problem in health care is not just further advances in health sciences, but also finding a way to disseminate information and to deliver care so that all can afford it, Norris said.

Computers are well-known in administrative areas of health care. They are starting to be used in intensive care monitoring, automation of pathology laboratories and health screening, he pointed out.

"It appears to me that ultimately the most efficient delivery of health care can be made by data services professionals and physicians working together in the same organization," Norris said. "The most important service will be health information related to individual needs and drawn from a vast data base of nutritional information and other medical data," he predicted.

Data services organizations can also find business opportunities in the needs of segments of society. Norris highlighted the possibilities for small businesses and for developing countries.

Lacking abundant capital, small businesses need training in good management practices, technology for new products and alternative business strategies, Norris said. Professional consultants are available in all of these areas, but most small businesses can't afford the fees.

However, with computer-based education and other computer services delivered in combination with professional expertise, greater efficiency can be obtained, resulting in an affordable cost, he stated.

"The needs of developing countries present another important business opportunity for data services companies. Lack of information is probably the single largest deterrent to the economic development in those countries," Norris suggested.

"Once information is available, the next step is using it efficiently, and that means the gamut of computer applications," he said. Cooperation in the form of joint ventures between small to medium-sized companies in the industrial countries and organizations in the developing couuntries is an important part of the answer, Norris stated.

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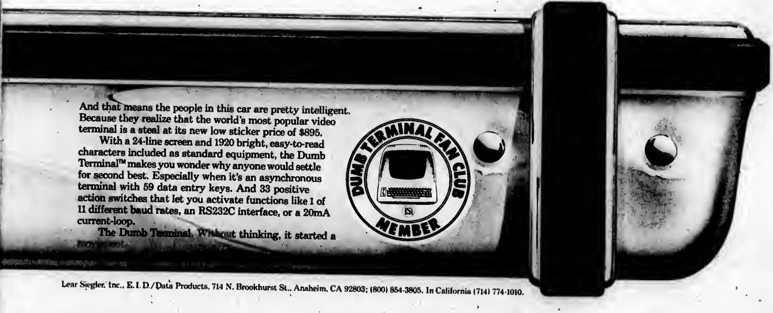

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Executive Corner

- Henry W. Weiss has joined Okidata Corp. as director of domestic marketing.
- James W. Duplex has been promoted to vice-president of the Customer Service Department at Bunker Ramo Corp.'s Information Systems Division.
- M.C. Abramson has been named senior vice-president for finance and support operations at Remote Computing Corp.
- Gary M. Kaner has been promoted to vice-president for manufacturing at Carterfone Communications Corp.
- James G. Wyllie has become corporate controller of Comshare, Inc.
- Dr. Gian F. Raffo has been named vice-president of Inforex, Inc.
- Michael G. Muller has been appointed vice-president/controller and Dan L. McGurk has been elected to the board of directors at Data Processing Power.
- Paul Schwartz has been appointed vice-president and general manager of Integrated Microsystems, Inc.
- John H. Woodley has become vice-president for manufacturing of Micropolis Corp.
- Roland E. Welch, Edward T. Harlyvetch, Roy C. Oakford and Thomas Skadeland have been appointed vice-presidents of Scan-Data Corp.
- Joe Cattorini has been named vice-president for engineering of Documation, Inc.
- Herbert T. Hensley has been promoted to vice-president for International Operations at Datapoint Corp.
- Frank Carr has been appointed commissioner of the U.S. General Services Administration's Automated Data and Telecommunications Service.
- John F. Watters has joined Pharm-Assist, a subsidiary of Synergex Corp., as president.
- Lewis C. Kasch has been named group vice-president for U.S. sales and international operations and Eberhard C. von Clemm has been appointed vice-president and manager of international operations at Tektronix, Inc.
- Ray Lappegaard has joined Data 100 Corp. as vice-president.
- Martin Duhms has been appointed vice-president for sales and marketing at Lexidata Corp.
- Karl E. Hayden has been named president of United Computer Services International Co.
- Eric Krause has become executive vice-president for marketing and Pete Stulik has been promoted to vice-president for manufacturing at Dynatch Corp.
- Larry L. Krummel has been appointed vice-president of software development at Ramtek Corp.
- E. Terence Bradunas, Gerald L. Dennison, Peter J. Kolgen and Eric C. Frankel have been named technical directors of Data Technology Industries, Inc.
- W.D. Warren has joined Datapoint Corp. as vice-president of engineering.

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Source Edp has made special arrangements with 527 organizations to participate in our special CIM/77 program. In our judgement, these firms represent the elite in terms of providing hardware/software sophistication, challenging job assignments, personal development programs, rapid advancement potential, favorable working environments and compensation (starting salaries range from $15-$35,000 plus, in some cases, additional bonuses or special performance awards). Those participating in CIM/77 have been drawn from every part of the country. They include computer users in all industries, computer services/consulting firms and computer main-frame and peripherals manufacturers. Their sizes vary from relatively small, rapidly growing firms to some of the nation's most well known and regarded organizations. The total gamut of job content for professionals in programming, systems and software is available with emphasis on opportunities in advanced data base, data communications, distributed processing and new information systems development projects. Many offer formal training programs in both technical and management development. In total, over two thousand positions are available within CIM/77 participants — and you can confidentially evaluate each and every one.

One call or visit to Source Edp gives you inside information on the nation's top 10% and where you might fit in.

Here's how CIM/77 works.

CIM/77 company participants have worked closely with Source Edp to develop detailed job descriptions covering all of their planned openings for November, 1977. Each description reviews initial assignments and qualifications desired, indicates your likely career path (or in many instances multiple career paths), how long it might be expected to reach your goals, the kinds of assistance in the form of training and exposure provided, a complete synopsis of all planned hardware, software and applications and compensation levels at each step along the way. These descriptions involving all 527 CIM/77 participants are available for your perusal at each of Source Edp's 34 branch offices in North America. If you qualify as outlined below, you may review them at your convenience between now and November 30, 1977. (Even if you don't reside in a Source Edp based city, we'll be happy to provide you with this information by telephone). By participating in CIM/77 you'll be able to learn what the computer job market is really like and compare your current position with thousands of others on a local and national basis. And, if you find unique situations that better suit your career objectives, Source Edp is in a position to make discreet contact and follow-up for you. Of course, there is no charge to you since our clients assume all of our fees and other expenses.

Who should participate in CIM/77?

CIM/77 has been specifically designed for computer professionals having at least one to seven years of experience in programming, software, systems development and/or marketing support ranging upward in responsibility to project management. More importantly, the CIM/77 program will have greatest benefit to those professionals who are truly concerned with maximizing their career potential, desire the broadest possible exposure and seek the challenge of rapid advancement.

Your registration in CIM/77.

To take advantage of CIM/77, simply call the Source Edp office nearest you during normal working hours or use our special toll-free number, 1-800/821-2270, extension 505, which will be open twenty-four hours a day, seven days a week through the end of November. (Missouri residents please call 1-800/892-7655). One of our professional staff (each of whom has had extensive computing experience prior to joining the firm) will find out something of your background and career interests and then make a specific appointment for you to review the CIM/77 job description file at your private convenience. (Please note that evening and Saturday appointments are welcome.)

In all, CIM/77 allows you to review over 2,000 specific new position openings — in complete confidence.

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Boston 617/482-7613
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New York 212/736-7445
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Torrance, CA 213/540-7500

Canada
Toronto 416/364-2919

If unable to call, write:
Source Edp
Corporate Headquarters
Department CIM/77-2
721 Enterprise
Oak Brook, Illinois 60521

(Please be sure to indicate home address, telephone and position title.)

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Match Your Growth Rate To Ours!

Come grow with On-Line Systems, Inc., the company where people make the difference. In just ten short years we've grown from a small timesharing company with one Pittsburgh office to a computer services company with over $16 million in revenues, offices in 18 cities in the United States and abroad, and stock traded over the American Stock Exchange.

Right now we're looking for the special kinds of people who have made us what we are today—people with an unusual combination of skill and versatility that bring innovative solutions to customer problems.

Our technical and marketing people work hand in hand in a professional environment that's charged with enthusiasm.

Programmer Analysts. Today openings with uncommon potential exist for Programmer Analysts at all levels—junior, intermediate and senior. You should have a background in FORTRAN with date base management experience, or other programming languages, plus the desire to respond personally and professionally to our customers' needs.

Marketing Representatives. With the support of our technical consultants, you will be responsible for marketing On-Line's services to a wide range of customers. You should have a demonstrated track record in sales and marketing with other time sharing companies, or be a technical consultant with a yen to move into sales.

These positions exist in our Pittsburgh, Atlanta, Washington, D.C., Clifton (NJ), Philadelphia, and New York offices, as well as many other major cities across the country.

If you're an innovative, enthusiastic professional who wants to work where *your* ideas are valued, we urge you to talk to us. Please send your resume, including salary history, in confidence to: Wallace A. Conway

On-Line Systems Inc.

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Our People Make the Difference.

PROGRAMMERS AND ANALYSTS

Let us offer you our professional expertise in finding the "RIGHT" position and company.

Our individualized search will provide you with local or national exposure depending on your geographical preference.

If you have at least 2 years experience in programming send your updated resume, geographical preference and salary requirements in strictest confidence to:

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DALLAS TEXAS 75243

SEARCH E D P , INC
SUITE 25 3181 LINWOOD AVE
CINCINNATI OHIO 45208

DATA PROCESSING PROFESSIONALS

Due to recent internal expansion, Lennox Industries Inc., a nationally recognized leader in the heating and air conditioning field, has positions available for Systems Analysts, Senior Applications Programmers and Applications Programmers.

Processing environment is a 370/158 under OS/VS1 providing real time and batch teleprocessing services for many locations throughout the United States and Canada.

These positions offer a competitive compensation and benefit package and excellent opportunity for growth.

Please submit a resume which includes salary history to:

John Dugan
Lennox Industries Inc.
200 S. 12th Avenue
Marshalltown, Iowa 50158
An Equal Opportunity Employer

INTERNATIONAL INFORMATION SYSTEMS PLANNER

Spanish and English Required

Base Salary $30,000 Plus Stock and Bonus

We are the exclusive representatives for this Fortune 500 Consumer Product Manufacturing Corporation. We have been asked to locate an individual who will visit and review DP operations and systems within fifteen foreign affiliates worldwide; develop and maintain profiles regarding DP equipment, plans, systems and budgets; work with international staff in developing standard application. Candidate must have international community experience as a planner or systems manager. Position requires 40% travel.

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Division of the Breen Group Inc

Paid travel and relocation expenses. Our clients are equal opportunity employers. Call or write in confidence, Toby S. Brimberg

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BOEING

CAD/CAM Specialists

The Boeing Company in Seattle, Washington is seeking CAD/CAM specialists to support the development and operation of sophisticated industrial computing applications in an interactive graphics/distributed network systems architecture. Experienced CAD/CAM specialists are needed in the following areas:

- **Scientific Data Base and DBMS Design**
- **Engineering/Manufacturing Data Base Administration**
- **Systems Architecture and Communications Networking**
- **Distributed Computing Systems Specification and Development**
- **2-D and 3-D Interactive Graphics System Development**
- **Systems Configuration Control Management**
- **CAD/CAM Systems Operation and Support**
- **Systems Testing and Certification**
- **Geometric Systems Research and Development**
- **Master Dimensions (Lofting) Systems Development and Support**
- **Advanced Numerical Control Methods**
- **Engineering Technology Systems and Applications Programming**
- **CAD Systems Development Management**

Candidates must have a BS degree or higher in Engineering, Computer Science or Mathematics and a minimum of three years experience in the development or application of scientific computing systems.

Attractive salary, fringe benefits and moving allowances will be offered selected candidates. And, living is a pleasure in the unspoiled Northwest with its many recreational and sports activities and relaxed life-styles.

Send your résumé to The Boeing Company, P.O. Box 3707-BKK, Seattle, WA 98124.
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BOEING
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PROGRAMMERS

BUILD YOUR CAREER ON OUR MINI!

Sperry Univac, manufacturers of the V-77 Family of high performance mini-computers has several career openings in Systems Marketing for individuals with the following expertise.

COMMUNICATIONS PROGRAMMING

Programmers/ Sr. Programmer Analysts

The position requires a minimum of 6 years communications experience in the design and use of transaction oriented systems and distributed processing. Knowledge of various communications protocols - synchronous and asynchronous (BSC, SDLC, etc.), a must. Mini-computer background, assembly language and one or more higher level languages desirable. (Dept. CWS-20).

APPLICATIONS PROGRAMMING

Senior Programmer

A thorough understanding of mini-computers with experience in applications programming on industrial, special commercial, or telecommunications systems. Applicants must be capable of producing detailed design from functional design specs and must be knowledgeable in one or more assembler and high level languages. BS degree or equivalent and at least 3 years of related experience is required. (Dept. CWS-21).

Sr. Programmer Analyst

Individual must have a depth of experience in systems and applications programming of mini-computers on industrial or special commercial, multi-tasking transaction-oriented systems. Understanding must include several computer systems (with their assembly languages and operating systems), two or more high level languages, and the use of telecommunications. The successful individual will be assisting with proposals, generating functional and detail design specs, and estimating software development costs and schedules based only on gross problem definitions. The ability to conduct design reviews is a must. BS degree or equivalent and minimum 9 years related experience including project management. (Dept. CWS-21).

Programmer

This is a growth opportunity for a programmer with experience in mini-computer applications in at least one language. Candidates must have the ability to code, debug, and document programs by interpreting and following detail system design specs. BS degree or equivalent experience is desired. (Dept. CWS-21).

SPECIAL SOFTWARE

Sr. Programmer Analyst

Minimum 4 years experience in assembly languages, FORTRAN and COBOL. Real-time Systems Programming required. Additional experience in Data Communications and/or Diagnostics desirable. BS degree or equivalent required. Hardware/software knowledge in drivers, handlers, special interfaces, etc., helpful. (Dept. CWS-22).

We offer an excellent salary and a comprehensive benefits package that includes free dental insurance. Please direct your resume and salary history in confidence to Personnel, indicating the appropriate department number on the envelope.

SPERRY UNIVAC
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MINI-COMPUTER OPERATIONS
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Royal Trust is embarking on an exciting phase of redesign of our major applications with the prime objective of fulfilling our users" requirements well into the 80's.

The environment we are creating will include a nationwide network enabling all our branches on-line access to our banking, financial and corporate applications, hosted by a IBM 3033. Consideration is also being given to the company's international requirements.

WHO ARE WE LOOKING FOR?

To fill the range of openings we are seeking:
— some of the best **Systems** and **Programming** people in the business
— **or,** those who despite limited experience demonstrate superior potential

Successful candidates will be enthusiastic about the use of technology over the next decade, they will also be a combination of logical thinkers and businessmen. They will be capable of applying computer technology to produce the most effective business solutions.

WHAT ARE WE OFFERING?

We are offering a work environment with:
— receptive management
— progressive responsibility
— small teams
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— the opportunity to take applications from feasibility through implementation
— innovative "functional" approaches to Systems and Programming
— a technical environment which currently includes ADABAS. CICS. JES3. MVS. TSO.

QUALIFICATIONS

These positions require a combination of experience in any of the following:
— user oriented systems analysis
— business and financial systems
— facilities and techniques in the user/computer interface area
— computer system design
— program design
— COBOL (2 years)
— use of DBMS or TP monitor
— OS/VS

If you feel you can successfully fill one of these challenging positions (which will be located in Ottawa), please send your resumé in confidence to:

D. AHARONIAN
Personnel Officer

Royal Trust

630 Dorchester Blvd. West, 6th Floor
Montreal, Quebec H3B 1S6

SYSTEMS/ ANALYST

$1395-1695 per mo.

Req. two years of data processing exp. with emphasis on system analysis; knowledge of principles, methods and techniques of system analysis and design. Knowledge of principles and practices of electronic data processing including computer programming techniques.

Apply: Yolo County Personnel Dept., Courthouse, Room 102, Woodland, CA 95695. PH: 666-8386.

Final filing date:
Oct. 28, 1977- 5 PM
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Affirmative Action Employer

MEDICAL INFORMATION SYSTEM DEVELOPMENT

PROGRAMMER/ANALYST

A Research Institute at the Indiana University Medical Center (Indianapolis) is seeking a bright and dedicated Programmer/Analyst to join in the development of a medical information system with national significance. Work involves networking, transaction processing and the development of an in-house data base system and an automated medical decision-making system. Applications extend to the clinical lab, the pharmacy, the medical record and the operation of the medicine clinics. Opportunity for strong interaction with users and responsibility for major application systems from design through implementation.

Position requires B.S. in Computer Science or equivalent technical degree and one to three years of employment as a Programmer/Analyst. Experience in the development of data management systems and/or PDP 11 RSTS, BASIC PLUS and/or RSX 11-M desirable. Experience with medical applications not needed.

Salary depends upon qualifications and experience. Please send resume (if possible, transcript) to Mrs. Joanna Lepper, 1001 West 10th St., Indianapolis, Indiana 46202.

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Are you better than your present job? Are you one of those people who fell into a pretty good job? With pretty good pay? With a pretty good company? And you're rocking along okay... but you could be doing a lot better. Consider a change to TI. We offer lots of challenge and outstanding opportunities to people who can prove their value.

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Analysts

System analysts to work with system engineers in trade-off analysis to support system concept and definition.

Send your resume in confidence to: Staffing Manager/
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IMS DATA BASE DESIGN SPECIALISTS

Responsibilities will include Data Base design, data dictionary maintenance; Data Base performance monitoring and tuning, and technical support.

The successful candidates will have extensive IMS/VS DB experience. Working exposure with the DC facility. Knowledge of JCL and COBOL with MARK IV a plus.

IMS SYSTEMS PROGRAMMERS

Responsibilities will include systems generation and maintenance, system performance monitoring and tuning, and error identification and debugging.

The successful candidates will have extensive IMS/VS DB/DC internals experience. Working exposure with MVS. Knowledge of NCP/VTAM, 3790, and/or SMP a plus.

We offer excellent salaries, benefits and growth opportunities. Send resume including salary history in strict confidence to: J.R. Brune, Amtrak, 955 L'Enfant Plaza SW, Washington, D.C. 20024.

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You'll be concentrating on NCP internals . . . 370 system programming in support of NCP . . . specifying and developing local and remote network control software . . . and custom communication interfaces.

OS/VS1 system programmer with internals experience. Your initial responsibilities will include VS/1 maintenance and tuning . . . training junior systems programmers . . . and operating system evaluation. You will then move deeply into operating system internals for specialized development in the areas of inter-partition communications, task management, storage management, input/output supervision, and access methods.

Both these positions require a BS or MS degree in Computer Science and appropriate experience.

Senior programmer/analysts . . . professionals able to take general systems specifications and develop them through to implementation. You'll work on a worldwide brokerage network and related financial systems . . . and must have at least five years of experience in Assembly language programming (IBM 370 and/or other systems) and systems development. You should have knowledge of communications-based systems, message switching, or real time applications. A degreed candidate is preferred. Exceptional experience will be compensated.

If you qualify, please apply by sending your resume, complete with salary history, to: Mr. Thomas J. Lynch, GTE Information Systems, East Park Drive, Mt. Laurel, New Jersey 08057. We're an equal opportunity employer M/F.

GTE
INFORMATION SYSTEMS

Simulation Language Development

PROGRAMMER ANALYST

A Health Services Research Institute at Indiana University Medical Center (Indianapolis) is seeking a Programmer/Analyst to join in the development of a general Computer Simulation Language with national significance. Work involves language development, compiler design, programming, and applications. Applications extend to medical practice planning, hospital service systems, and health planning/policy analysis. Opportunity exists from major contributions to extending language capabilities and coding implementation to strong interaction with users in application and analysis.

Position requires BS and/or MS in Computer Science or equivalent, with background in data structures, compiler design, and data base management. One to three years of employment as a programmer/analyst desired with FORTRAN and related languages. Experience with computer simulation and operations research helpful but not essential. Salary depends upon qualifications and experience. Please send resume (if possible, college transcript) to Mrs. Joanne Lepper, 1001 West 10th Street, Indianapolis, Indiana 46202.

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Security because of the company's exceptional success, an acknowledged superior product line, a commitment to excellence, increasing investment, and a superb profit record - which is perhaps the greatest security, and the opportunity of a parallel position when you return to the States.

Career Progression
Because of our client's exceptional growth rate you are likely to achieve the more senior positions which you merit very much faster than with your present organisation. **Some Key Senior Positions are available now.**

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The company recognises that their greatest investment is in their people. Professional training safeguards this investment and ensures that you stay ahead technically and professionally. Training is carried out in both the United States and Europe. You will not fall behind technically, and you will gain personal and business experience which will add to your value as a computer professional.

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Ability to work effectively, with marketing and systems engineering, in the development of the business.

Program Support Representatives
The solution of complex systems software problems.
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To applicants with relevant experience there are **No Restrictions.**
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Your name will not be disclosed to our clients without your permission.
Resumés should be sent air mail quoting Ref.- Computerworld to: DPSC Group Limited, International Management and Personnel Consultants, Crown House, Morden, Surrey, SM4 5EU, England.
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DP
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H-600 SYSTEMS AND SOFTWARE PEOPLE

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CONTROL DATA CORPORATION

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W.

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Reporting to V.P. - Finance, you will be responsible for designing and programming major business systems. Requires "shirtsleeve" individual with BS degree plus minimum 3-4 years experience in COBOL or PL/1 in an OS/360 environment.

Software Development Programmers

Real-time software development and problem solving for our Computerized Tomography X-Ray Scanners and Medical Microdose* X-Ray Systems. Will actively interface with customers and internal departments on softwere design. Bachelor's Degree in EE, Mathematics or Computer Science plus 3-5 years experience emphasizing NOVA assembly lenguage - working knowledge in "multitasking" and FORTRAN IV preferred.

Submit reaume including
salary hiatory or contact
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955 Massachusetta Avenue,
Cambridge, MA 02139
(617) 868-1600.

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We Never Pass Out A Laundry List

Romac policy forbids using the "Laundry List Technique." Other personnel consultants send out huge lists of names to prospective employers, we never do. Romac supplies its clients with only the best qualified professionals.

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Contact Romac & Associates, A. L. Lemay, President, 2 Sun Life Executive Park, Wellesley Hills, MA 02181 for transmission to our Partners in Atlanta, Boston, Buffalo, Charlotte, Hartford, New Haven, New York, Philadelphia, Portland, Rhode Island, Rochester/Syracuse, Stamford.

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NCR's Terminal Systems Division in Millsboro, Delaware is a high volume manufacturing facility concerned with the design and production of POS terminals. We are currently experiencing substantial increases in Engineering activity and as a result have immediate needs for programmers interested in growth opportunities.

Desired Experience

- Systems
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  - Diagnostics
  - Operating Systema
- Applications
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Basic Qualifications

- 1-3 years experience in Assembly language with mini or microcomputers
- 8080 experience a plua
- BS in CS, EE or Math

In addition to excellent career opportunities with NCR, our Millsboro location is right in the heart of the Delmarva Peninsula, better known as the "land of Pleasant Living." We're just minutes from marine recreational areas, wildlife preserves and the nation's finest beaches.

Please send resume with salary requirements:

Ron Tull, Dept. CW-1024
Terminal Systems Division
NCR Corporation
P.O. Box 607
Millsboro, DE 19966

NCR

MINI-COMPUTER SYSTEMS PROGRAM ANALYST

Professional career opportunity with a major oil company in Houston for an individual with working knowledge of:

- PDP 11 Mini-computers
- RSX11 Operating System
- PDP 11 MACRO Assembler Language and Fortran
- Real-time Programming Technique

Experienced in one or more of the following areas would be desirable:

- Geophysical signal processing
- Input-output device programming and interface design
- Communication networks and protocols

BS degree in a technical field would be preferred.
Send resume, salary requirements, and college transcript to:

Manager, Employee Relations
P.O. Box 36487
Houston, Texas 77036

An Equal Opportunity Employer

Computer Systems Specialists

Lockheed announces challenging career opportunities for qualified computer specialists in areas of hardware evaluation, planning, performance and systems software.

Hardware Systems Specialists

Qualified individuals will assume high level positions having direct interface with senior company management. Candidates should have a B.S. degree, at least five years in data processing experience, and knowledge of hardware/software systems. Individuals will perform evaluations, direct planning efforts, and manage the performance of current and future computing equipment for the company. Experience with IBM equipment, minicomputers, peripheral hardware, distributed systems, and data communications is desirable. For further information, call Dick South collect at (213) 847-6121.

Software Systems Specialists

You will be a member of a team maintaining the MVS operating system for two IBM 370-168's which support more than two hundred on-line terminals under IMS/VS, TSO, RJE and interactive graphics. The organization is moving rapidly this year into distributed processing with terminals attached to minicomputers in turn attached to the host 370. IBM 3850 Mass Storage and 3350's are already installed. Candidate should have at least five years experience in sysgens, installing PTF's, problem diagnosis, and assembly language coding. Most recent experience should be with MVS and prior experience with MVT. Degree in Computer Science is preferred. For further information, call Duane Bickel collect at (213) 847-6121.

These positions command excellent salaries and fringe benefits including savings, medical and dental plans.

Please write or send resumes to Bill McVeda, Lockheed Employment Office, P.O. Box 551, Burbank, CA 91520.

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Move ahead with one of the world's most successful computer manufacturers while living in one of America's most acclaimed vacation centers. San Diego offers you the climate of your choice, from the cool, mild breezes of the ocean to the constant dry warmth of true desert—and every gradation in between. Create your special lifestyle in a hilltop hacienda, an urban highrise, a country club condominium. Explore mesas and canyons, 70 miles of local beaches and bays, the byways of Baja. Continue your professional education in one of the area's many major colleges and universities, enjoy sports all year, from tennis to whale-watching. NCR—for a good living *and* a good life.

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- FIRMWARE
- DIAGNOSTIC PROGRAMMING
- PERFORMANCE MEASUREMENT
  (GPS Simscript Modeling/Simulation)
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  (Design, develop programs to support software testing, release and repair.)
- SOFTWARE DEVELOPMENT
  (Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributive processing, virtual machine, time sharing.)
- SOFTWARE QUALITY CONTROL
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  (Experience desired in both Transit and Proof of Deposit applications plus features such as CRT Reject-Reentry.)

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents, generous relocation allowance.

Please send resume immediately including salary history, training and experience to the Professional Placement Office at the address below

NCR DATA PROCESSING DIVISION
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PROGRAMMER/ ANALYST LEARN CICS

Leading manufacturer in the San Fernando Valley, California, has an opening for a programmer/analyst with a minimum of 3 years experience to work in IBM 370 DOS/VS CICS environment.

Qualified person must have strong COBOL background with some RPG II experience. Degree preferred. Salary based on experience. Profit Sharing and liberal benefits. Please send resume in confidence to:

CW Box 320
797 Washington St.
Newton, Mass. 02160

PROGRAMMERS/ANALYSTS

The Dayton areas largest and most progressive financial institution has openings for experienced Programmers and Systems Analysts.

A bachelors degree in Computer Science plus a minimum of 2 years NCR NEAT/3 or NCR COBOL experience desired. Experience with CIF, CIRF and/or commercial bank applications preferred.

We offer an excellent salary PLUS an outstanding benefits program. If you qualify, send your resume along with salary history to Personnel Director:

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FREIGHTLINER®

Management Information Systems

Due to expansion in the M.I.S. department, Freightliner Corporation has openings for data processing professionals in the following areas:

Material Planning— Senior Systems Analyst

Responsibilities to include analysis, development, and implementation of systems to support material planning function at truck assembly and parts manufacturing plants. Requires strong exposure to MRP, bill of material and manufacturing scheduling. Must be capable of leading a major project effort.

Data Base Administration— Data Administrator

Reporting to the Data Base Administration Manager, data administrator duties will include data relationship analysis, data planning for corporate and IMS usage, and data dictionary/directory usage and management. An IMS systems programming or applications analysis background is desired; working knowledge of UCC-10 is a plus.

On-Line Systems— Systems Programmer

The On-Line Systems Department is responsible for IMS/DC and CICS. Specific systems programmer responsibilities are CICS and IMS gen, maintenance, and performance analysis. Experience in both COBOL and BAL is required; a background in manufacturing systems and MVS is desirable.

Successful applicants will have a proven performance history in a large scale (158/168) O/S or V/S environment. Salaries are competitive, benefits are excellent.

The Corporate office of Freightliner, the hallmark of custom built trucks, is located in Portland, Oregon. Please send resume and salary history in confidence to: **Ms. Adair Weissenfluh, Freightliner Corporation, P.O. Box 3849, Portland, OR 97208.**

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DATA PROCESSING PROFESSIONALS

Townsend and Bottum, Inc., a growing firm in the construction industry, has immediate openings in its Ann Arbor Data Processing Department. Computer professionals with OS/VS1 or DB/DC knowledge are required for Townsend and Bottum, Inc. to continue to meet its fossil and nuclear power plant construction commitments.

SYSTEMS ANALYSTS

Will work with users in accounting, costing, engineering, scheduling, and estimating departments. Applicants should have three (3) years experience in preparing project definitions, design specifications, user training, and DB/DC software. Strong verbal and written communications skills are necessary.

SYSTEMS PROGRAMMER

Will join a systems programming group responsible for providing technical support to the programming and operations staff. Duties include generation, maintenance, and tuning of operating systems and DB/DC software. Applicants should have three years experience in systems programming with current IBM hardware and software.

OPERATIONS MANAGER

Will supervise the computer operations and systems programming staffs, and provide functional supervision for the remote locations. Applicants should have experience in operations with at least three years of supervisory experience:

Please send resume to the attention of:

SHERREE ARNOLD
HUMAN RESOURCES DEPT.

TOWNSEND and BOTTUM, INC.
P.O. BOX 1368 ANN ARBOR, MI 48106
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PROJECT SYSTEMS ANALYST

Consortium of Northern Illinois Community Colleges has opening for systems analysts to develop computer programs for libraries. Duties include supervision of project programmers. Must have experience with 370 DOS/VS Operating System, COBOL programming, and familiarity with CICS/VS on-line programming. Phone (312) 697-1000 or write Jack Weiss, Elgin Community College, Elgin, IL 60120. Deadline for notification Nov. 15. An equal opportunity employer.

Bank EDP Auditor

THE FIRST NATIONAL CHARTER CORPORATION

is seeking an individual for an EDP auditing supervisor. The successful candidate must have a college degree in accounting, business or computer science. An MBA, CPA, CDP or CIA is desirable.

The individual should be experienced in all phases of computer systems, including development and overall operations, with 3 to 5 years in the computer audit area.

Salary commensurate with experience, including complete benefit package. Send complete resume and salary requirements to:

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MADISON

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Department of Health and Social Services

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Reporting directly to the Secretary of the Department, this position has the support and opportunity to design and build a new EDP organization. You will assume immediate responsibility for a staff of over 100 including 45 Programmer/Analyst professionals. You will build the staff in size, technical sophistication and in management skills. You will work with top administrators and geographically distributed users in helping them to grow in the use of EDP tools. You will be challenged to significantly influence the effectiveness of human services in Wisconsin.

Qualifications: 2 years of advanced managerial experience. Apply by Nov. 21, 1977. For further information contact Betsy Walton (608) 266-9865, Personnel Task Force, Room 1121 at address below.

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Wisconsin State
Bureau of Personnel

One West Wilson Street
Madison Wisconsin 537

Equal Opportunity Employer

Technical Marketing Support Specialist

Business Applications

The Graphic Arts Group of Commercial Products is seeking a Technical Support Specialist to assist in the design, development and marketing development of application software for business applications for newspapers. You must have existing knowledge of RSTS/E (CTS-500) and applications programming experience with COBOL/DIBOL involving accounts receivable, billing payroll, etc. Responsibilities will involve interfacing with Engineering on new software developments and to provide the Graphic Arts Sales organization with sales support. This will include technical sales support on RSTS/E (CTS-500), COBOL, RPG 11, and Data Base Management (IAS experience will be acceptable).

A demonstrated ability to interface with customers and our sales force is also essential for this challenging position. This is an excellent opportunity for growth in a rapidly expanding commercial market. You will be based in Merrimack, New Hampshire.

If you are interested and qualified, please forward your resume, including salary history and requirements to Fred Arno, Digital Equipment Corporation, Dept. E1024 3807, 129 Parker Street, Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.

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Are you lost in a large data processing department-or have limited opportunities in a small data processing department. Our international manufacturing corporation can offer you a challenge, involvement and opportunity.

Our current need is for a Programmer/Analyst experienced in BAL and COBOL. Major application of position is a financial data base system. Environment includes on-line programming, local and remote data processing activity on IBM 370/138, DOS/VS and Power VS.

You will enjoy a competitive salary and excellent benefits. Send a resume with salary requirements, confidentially or call:

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EDP
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As part of our expanding product line for the health care industry, Tymshare, Inc is developing an advanced mini-based Hospital Information System that includes new versions of ADT, OP ER, Order Entry and Financial System interface modules. The system is accessed via CRT-equipped intelligent terminals supporting multiple concurrent users.

For this long-term development project, Tymshare is seeking a Senior Designer with heavy recent experience in the design of a transaction driven database inquiry system. Ideally, you will have acquired this experience through participation in the design of an HIS, but we will consider equivalent experience in the design of an analogous system for another industry. Other desirable qualifications are experience with the PDP-11, the RSX-11M operating system, and the RM 11 data management system.

We offer an excellent salary and benefits program plus growth opportunities with an innovator. To be considered, send your confidential resume to *H I S c/o J. Malone, Personnel Department C, TYMSHARE, Inc., 20705 Valley Green Drive, Cupertino, California 95014. An equal opportunity employer m/f*

TYMSHARE INC.

PDP-8 Systems Programmers

Major software development projects for PDP-8 systems are now underway at Digital. We have several challenging openings at all levels to be involved in software projects on our traditional PDP-8 minicomputers and on our new microprocessor-based systems, the DEC station-78.

SUPERVISORS

Directing the work of a staff of skilled systems programmers, you'll assume total responsibility for several projects, including language development for the PDP-8. You must have previous experience with OS/8 and additional PDP-8 software.

PROJECT LEADERS

This is your opportunity to plan and manage projects which will enhance the Real-Times Operating Systems capabilities of the PDP-8. Real-Time Operating Systems experience is required.

SENIOR PROGRAMMERS

We are seeking lead programmers for an advanced data communications project for the PDP-8. You must have communications software experience, and PDP-8 background will be considered useful, but not essential to fill these openings.

PROGRAMMERS

Several experienced assembly language programmers are needed to work on Real-Time Operating Systems and language development. Experience with PDP-8's preferred.

If you are interested in the above positions, please forward your resume including salary history, stating position desired to Joe Hart, Digital Equipment Corporation, Dept. B1016 31807, 146 Main Street, Maynard, Massachusetts 01754. We are an equal opportunity employer m/f.

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Progs (1-2 yrs)	$15-18K	Soft Prog (5+ yrs)	$22-28K
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We offer assistance in evaluating your present position. Just send your resume and we will call you to discuss your objectives and explain how we might help you reach your goals.

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Sperry Univac Field Analysts have a key responsibility in marketing headquarters interface and sales/proposal preparation and service support. A technical degree is desirable, but creative, problem solvers are a greater asset to our sales force. A minimum of 2 years pre and/or post sales support in real-time commercial (Data Base, Data Communications, Distributed Processing) and/or real-time scientific applications is required.

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Resumes may be sent to:
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or
2722 Michalson Drive, Irvine, CA 92713

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We offer opportunities to participate in the design and development of on-line transaction processing software. You would also be involved with software interfaces to data base management systems. Candidates would be working with a software development team engaged in transaction processing software development for the NCR Criterion processors utilizing VRX.

To qualify for these outstanding positions, candidates would have a technical or computer science degree. 4-6 years experience in software development projects is required. A thorough knowledge of operating systems, assembler language programming, and real-time concepts are among the qualifications you would possess.

PROGRAMMERS
(Assembler Language)

We are seeking programmers with a technical or computer science degree plus 2-4 years programming experience. Programming experience will be in ssembler language.

MANUFACTURING SYSTEM ANALYSTS

NCR is now involved in the development of an integrated, on-line Manufacturing Control System for use both in our manufacturing divisions and for sale to our customers. The system will address the following application areas:

- BILL OF MATERIAL
- STORES CONTROL
- INVENTORY MANAGEMENT
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- ROUTING
- WORK-IN-PROCESS
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- MATERIAL REQUIREMENTS PLANNING

This development effort has created opportunities in the following area:

SYSTEMS ANALYST/PROGRAMMERS

Major emphasis will be to prepare the system application software and documentation for external release for use on NCR's new Criterion computer line. To qualify the candidates' background should include 3-5 years systems and programming experience using COBOL in one or more of the above application areas. Ideally that experience will also include the use of data base and on-line processing.

The ideal candidate will have a bachelor's degree in an appropriate discipline.

To investigate these outstanding opportunities, write to:

NCR
Complete Computer Systems

Department VM
Corporate Executive &
Professional Recruitment
NCR Corporation
Dayton, Ohio 45479

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PROGRAMMER ANALYST

Get on Target With Seawheels, Inc.

Seawheels, a leader in direct truck service for marine containers between all U.S. ports and all U.S. points, has experienced unprecented growth during the last seven months. As a result, we are seeking a Programming analyst.

The candidate will be responsible for designing, programming, testing, documentation, implementation and operation of new and existing systems for a mini computer.

One to three years of programming is desirable. Applicant should be familiar with business and ccounting functions.

Send resume to:

Sea Wheels

Office Manager—P.O. 810, Carlisle, Pa. 17013

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NCR Prog/Anal	18K
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Anal Honeywell	18K
System/3 Mgr	19K
P/A, Burroughs	17K
P/A, Systems/3	16K
PDP Prog	16K
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Representative listing of current southern opportunities. Additional positions available in south and nationwide. All fees paid. Call Ole Olson or mail resume for fast, confidential service.

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programmer

Excellent tec'. oppty. to learn state of the art. Company's plans include CICS & DL-1. Min. 2 yrs. COBOL IBM/DOS. $15-$18,000 (Fee Paid). Contact Jim Staunton.

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(617) 423-6440

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THE SEARCH IS ON

Honeywell

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PROCESS CONTROL ENGINEERS --Degree in Engineering with background in Computer Sciences. 3-5 years of experience in the Application of Process Control Computers within the Petro-chemical, Chemical, Pulp and Paper or Textile Industries. Local and out of state. **Salary to $24,000.**

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COMPUTER ARCHITECT -- Senior Logicians advanced development to participate in the definition and implementation of a new family of high level processors. Primary responsibility will be the definition of the Processor/Memory/IO organization. Must have been involved in the successful design of a product in the marketplace. BS/MSEE in Computer Science and a minimum of 3 years experience as a systems designer. **Salary to $40,000.**

COMMUNICATION DESIGN ENGINEERS -- Terminal Logic Design Engineers familiar with Synchronous Data Link Control (SDLC), BSEE plus minimum of 3 years experience. **Salary to $25,000.**

Qualified candidates will receive immediate consideration and are urged to contact Mr. Robert Norton, in strict confidence, or to submit confidential resume with current salary information for review. All interviews are by appointment. Client companies assume all fees. For those who find it inconvenient to call during working hours, our office will be open until 7:30 p.m.

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SOFTWARE ENGINEERS

on the San Francisco Peninsula.

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We're Looking For?**

Lockheed Missles & Space Company has an exciting opportunity for the right individuals with rich and varied software backgrounds. Responsibilities include software development beginning at the conceptual level continuing through flight test support, and ranges from establishing hardware/software tradeoffs, through software specifications, and onto participation in full system integration and test.

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For immediate consideration, please send your resume to Professional Employment, Dept. CW-1024, P.O. Box 504, Sunnyvale, CA 94086. We are an equal opportunity affirmative action employer.

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Link your career to the unprecedented growth of ADR's Software Products Division. Participate in marketing and supporting the most extensive software product line in the industry. We are interested in dedicated professionals who are capable of calling on and servicing the best known companies in the country, our clients. If you have proven outstanding talents in the job areas shown below, we believe you will want to consider career opportunities at ADR.

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- 2 years COBOL application programming.
- Excellence in OS JCL.
- Enjoy working with people.
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- 2 years COBOL programming
- Moderate travel.
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Some Facts About ADR . . . founded in 1959 . . . development personnel average well over 8 years with company . . . field and sales personnel over 5 years . . . stable (Over $15 million last year) . . . traded on American Stock Exchange . . employs over 300 people . . . small enough for personal recognition . . . nation's oldest independent software company . . . representatives throughout the world . . . software product line diverse, versatile, state-of-the-art . . . excellent employee benefits.

Please send resume with full details including current salary and position desired in complete confidence to: PERSONNEL DIRECTOR APPLIED DATA RESEARCH or call (809) 921-8550.

APPLIED DATA RESEARCH, INC.
Route 206 Center, CN-8,
Princeton, N.J. 08540

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PROGRAMMING

CAREER OPPORTUNITIES

Control Data's Peripheral Products Group is seeking dynamic computer professionals with IBM System Software experience. Opportunities exist in development and support of IBM System 370 Operating System related software.

SOFTWARE ARCHITECT

Minimum of 3 years experience in the design of IBM operating system related software. Must possess internals knowledge in the state-of-the-art IBM virtual systems. Requires experience in assembler language, utilities, data management, job management and supervisor services. Knowledge of TSO, JES 3 and VSAM is desirable. Requires good organizational and documentation skills. Development activities are conducted in a structured design/programming team environment.

SOFTWARE SUPPORT SPECIALISTS

Minimum of 3 years IBM system programming experience with internal knowledge of MVT, VS 1, SVS or MVS. Knowledge of O/S utilities, data management, job management and supervisor services required. Must be willing to accept short term domestic and European travel assignments.

SYSTEM PROGRAMMERS

Minimum of 3 years IBM system programming experience with internal knowledge of MVT, VS 1, SVS or MVS. Knowledge of utilities, data management, job management and supervisor services required. Knowledge of TSO desirable. Should have at least 3 years of IBM assembler coding experience. Experience in structured programming environment is desirable.

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2200 Berkshire Lane
Plymouth, Minnesota 55441
(612) 553-4720

CONTROL DATA CORPORATION

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EDP

SOUTHEAST

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SOFT: OS/IMS	$24K
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Several positions open in the above categories. Mail confidential resume or call Joe Sewyer, the EDP Personnel Specialist, (803) 233-2546.

EXCEL PERSONNEL

1421 Laurens Rd., Suite 200A
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Central

New Hampshire

"Central New Hampshire firm needs a systems analyst with a minimum of 3-5 years experience as a project leader. RPG II environment. This position involves heavy association with user departments. Relocation fees paid. Please submit resume and salary requirements to:

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DATA PROCESSING PERSONAL

EG&G Idaho, Inc., the prime operating contractor to the Department of Energy at the Idaho National Engineering Laboratory, has immediate openings for:

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A middle-management position, responsible for 20-30 professionals involved with PMS, Manufacturing, Procurement and Property. This position requires a minimum of 10 years' experience in development and implementation of computer systems with 5 years in a managerial role. A Master's degree or equivalent in Computer Science or Business Administration is required. Experience in systems analysis, COBOL programming, Data Base Management Systems and on-line applications is highly desirable.

SENIOR SYSTEMS PROGRAMMER

A highly responsible position, implementing and maintaining the ADABAS Data Base Management System and TASK/MASTER Data Communications Monitor on IBM 360/75 OS-MVT computer system. Requirements are BS Math, Computer Science or related technical field, design and implementation of DB/DC systems, working knowledge of OS/360 internals and input/output access methods, and experience in supporting IBM compatible 3270 terminal systems. Desire experience in development, maintenance and implementation of ADABAS and TASK/MASTER.

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Our growing Computer Analysis and Programming Division has an excellent opportunity for an individual familiar with the ADABAS Data Base Management System. Candidates should have 6 years of applicable experience with a minimum of 2 years' experience with ADABAS and a data communication monitor in a DBA organization. A degree in Computer Science, Math or a related field, and experience with TASK/MASTER highly desirable. Responsibilities include developing and enforcing standards and procedures, serving as internal consultant and educator, plus designing and maintaining the Data Base.

Idaho Falls, Idaho is a medium-sized community located close to top-flight winter sports areas (Sun Valley, Jackson Hole, Grand Targhee) and unexcelled summer recreation areas (Yellowstone, the Salmon and Snake Rivers, the Grand Tetons). If interested and qualified, please submit resume, including salary history and requirements, in confidence, to:

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A Bachelors degree in Computer Science or Mathematics or an equivalent combination of education and experience is necessary. Some projects will require systems programming. Expertise in FORTRAN is absolutely essential. Knowledge of PL 1, BASIC, APL or other languages helpful. Familiarity with CDC CYBER, IBM 360 or HP2000 systems desirable. An Equal Opportunity Affirmative Action Employer. Send Resume to:

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Applicants should possess the following qualifications: ten years in data processing of which a minimum of four years must be in departmental management. Prior experience in a medical environment would be helpful, but not required. The applicant must also have an in-depth knowledge of IBM 370-s, 3300 disc drives and communication devices. A working knowledge of BAL, COBOL, DOS/VS and the teleprocessing environment will be required.

Please submit resume and salary history in strict confidence to:

E.L. Horeis
Nebraska Methodist Hospital
Employee Relations Director
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This job is one of internal consulting, developing conceptual design specifications, project coordination, conducting acceptance tests and project installation activities. It includes strategy setting participation at the highest level within a particular system development area and working with a line user as their dedicated systems resource in all EDP activities. You will be responsible for coordinating their development strategy with the Centralized Data Processing Department to realize new systems and/or enhancement products.

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The successful candidate will have at least 10 years of systems/data processing experience, a minimum of 5 years of which have been in positions of progressively responsible management or supervisory positions. Past experience must include direction of major operational data processing projects and implementation/conversion of new applications involving health care applications. Experience must include the development, implementation, and operation of academic and administrative systems in an institution of higher education. Candidates having one or more advanced degree and/or experience in an academic health sciences center will be given preference.

Applications and resumes will be received through Friday, November 18, 1977, by

Mr. Robert A. Peterson
Vice President for
Administration & Finance
University of Oregon
Health Sciences Center
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DATA PROCESSING

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Ruth Cina
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A-3 Government Center
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4615 Southwest Frwy
Houston, TX 77027
(713)960-9102

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DATA PROCESSING CAREERS

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Expansion of a leading east coast data processing firm requires the addition of a Product Manager to be responsible for the market plan for manufacturing systems. In this capacity, you will work with outside consultants, collect and evaluate market data & coordinate with internal groups in the creation of marketing plans.

Candidates for this position must have a background in data processing & manufacturing as well as experience in product marketing and/or sales. A college degree or equivalent experience is required.

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(609) 667-4488

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Director of Data Processing

IBM 370 DOS COBOL installation is seeking experienced manager to direct a staff of 10 for providing educational data processing services for Douglas County schools. Background should include a degree in Business Administration, Computer Science, or related field. At least two years experience in supervision of personnel, systems and programming knowledge, and preferably experience in educational data processing applications.

Salary is $21,600.00 - $23,968.00 per year. Liberal vacation and fringe benefits. Position open December 1, 1977. Submit resume to Mr. Tom Huebner, Superintendent, Douglas County Intermediate Education District, 1871 Northeast Stephens, Roseburg, OR 97470. Phone (503) 672-6571

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IBM 168 MVS JES2
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Immediate opening for an individual with demonstrated technical, business and human relations skills. Desired qualifications include at least 5 years experience in management of a computing facility in a University setting and an advanced degree in Engineering, Computer Science or Mathematics.

Working in a multi-disciplined, IBM 370/168 environment, utilizing modified CMS software, the successful candidate will be responsible for operations and development of the University Computer Center; marketing of its services to the Univeristy and external users and for supporting planning for computing on a University-wide basis. Salary negotiable.

Closing date for applications, which will be treated in confidence, is November 25th, 1977. Please submit qualifications including references to: Doctor Samuel A. Lawrence, Vice President for Financial and Planning Services.

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Responsibilities include representing the Computer Center to the Academic Community. Specific areas include User Services and Systems Programming.

Qualifications include a B.S. Degree in Computer Science or related field, 2-3 years experience as a systems programmer on a DECsystem-10 (knowledge of TOPS-10 internals is a must) and the ability to work well with users. Experience in a university environment is desirable.

Senior Analyst, Administrative Services

Responsibilities include User Support to key administrative offices, systems analysis and design, creation of program specifications for junior staff members, control of reports to state and federal government.

Qualifications are B.S. in Computer Science or related field, 2 years experience in analysis and design, 1-2 years experience in COBOL programming, ability to work well with users. Knowledge of NCHEMS Planning Management System desirable.

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Old Dominion University
Norfolk, Virginia 23508

Old Dominion University is an Equal Opportunity/Affirmative Action Employer.

ENGINEERING PROGRAMMER ANALYST

Major S.E. corporation located in Atlanta has immediate openings for Engineering Programmer Analysts. Individuals should have at least one year programming experience in COBOL or Fortran on IBM 370 as well as I.M.S. experience. Degree in engineering, computer science, or related field desirable. Some specific position requirements with programming experience are:

Civil Engineer with soils mechanics background
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The duties include designing writing, documenting and maintaining programs; working closely with other administrative offices, and managing computer operations. Experience with a university environment is desirable. Position available immediately. Salary range $16,000 to $20,000.

Initial inquiries by telephone may be directed to Dr. Clark E. Runnion, (814) 266-9661, ext. 338. Applications consisting of a detailed resume and a list of three references who may be contacted must be received by Personnel Services, University of Pittsburgh at Johnstown, Johnstown, Pa. 15904 no later than November 21, 1977.

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Required qualifications include:

Proven competence in analysis, design, programming - especially on large systems
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- Proven ability to communicate effectively

Preference given to candidates having experience with the principles and techniques of top-down development and structured programming, on-line data-base systems experience (especially INTERCOMM, MODEL 204) and leadership experience.

The University offers full benefits, competitive salary, and a challenging growth opportunity. Send resume with names of professional references and salary history to:

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COMPUTER CENTER DIRECTOR BOWLING GREEN STATE UNIVERSITY

Bowling Green State University is seeking nominations and applications for the position of Director of Computational Services. The director reports to the Vice President of Resource Planning and is responsible for the effective planning, policy development, management, and budgetary control of all academic and administrative computing services to faculty, staff and students. As part of a regional computer center, the University uses two large systems: IBM 360/75 and Univac 1110. The applicant must have an advanced degree, substantial managerial or supervisory experience in data processing (preferably in a university or regional center environment), and demonstrated technical and leadership competencies. Starting date as soon as possible. Deadline for applications is November 15, 1977. Starting salary: competitive, depending upon experience and qualifications. Send detailed resume to: Dr. Mark Asman, Chair, Search Advisory Committee, 230 McFall Center, Bowling Green State University, Bowling Green, Ohio 43403

Equal Opportunity/Affirmative Action Employer

ASSOCIATE DIREDTOR COMPUTER CENTER SYSTEMS DEVELOPMENT & PROGRAMMING

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Successful candidate must possess a degree in Computer Science, or a related field, with broad knowledge and experience in administrative development and the supervision of programmers. Experience in a University environment desirable.

Send resumes to Dr. Hovey G. Reed, Director, University of Alabama Computer Center, Box 2511, University, Alabama 35486.

The University of Alabama is an equal opportunity affirmative action employer.

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We intend to fill the position by Feb. 15, 1978. Applicants should send complete resume and arrange that three current letters of professional reference be sent to: Dr. Spotswood D. Stoddard, Acting Chairman, Computer Technology Department, Indiana University-Purdue University, Fort Wayne, IN 46805. An Equal Opportunity/Affirmative Action Employer.

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EOE/AA

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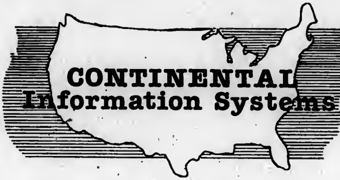

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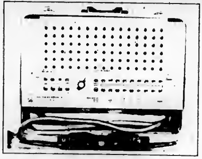

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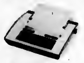

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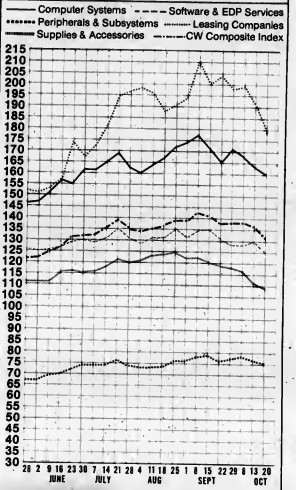

Earnings Reports

COMDISCO
Three Months Ended June 30

	1977	1976
Shr Ernd	$71	$.61
Revenue	18,246,185	22,848,347
Earnings	739,177	615,324
9 Mo Shr	2.11	1.55
Revenue	83,505,363	60,788,099
Earnings	2,189,162	1,733,448

COMPUSERVE
Three Months Ended June 17

	1977	1976
Shr Ernd	$.26	$.21
Revenue	3,469,000	2,393,000
Earnings	301,000	218,000
6 Mo Shr	.56	.42
Revenue	6,668,000	4,660,000
Earnings	642,000	441,000

COMPUTER DATA SYSTEMS
Year Ended June 30

	1977	1976
Shr Ernd	$.27	$.62
Revenue	6,049,900	6,356,000
Earnings	154,000	336,000

COMPUTERIZED AUTOMOTIVE REPORTING SERVICE
Three Months Ended June 30

	1977	1976
Shr Ernd	$.20	$.22
Revenue	3,017,000	2,840,000
Earnings	326,000	362,000
6 Mo Shr	.38	.38
Revenue	6,005,000	5,312,000
Earnings	619,000	614,000

CONRAC
Three Months Ended June 30

	1977	1976
Shr Ernd	$.91	$.71
Revenue	33,512,000	34,509,000
Earnings	1,938,000	1,462,000
6 Mo Shr	1.67	1.31
Revenue	67,540,000	62,135,000
Earnings	3,561,000	2,607,000

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 19, 1977

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1977 RANGE (1)	CLOSE OCT 19 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	AMDAHL CORP	22- 44	42 1/4	+ 3/4	+1.8
N	BURROUGHS CORP	55- 91	65	- 5/8	-0.9
O	COMPUTER AUTOMATION	18- 30	21	-2 1/8	-9.1
N	CONTROL DATA CORP	20- 26	20 3/8	- 3/4	-3.5
O	CRAY RESEARCH INC	15- 29	22	-1 1/2	-6.3
N	DATA GENERAL CORP	35- 51	43 1/2	-1	-2.2
N	DATAPOINT CORP	18- 32	27 1/4	-1 7/8	-6.4
N	DIGITAL EQUIPMENT	37- 53	43 1/8	-1 3/4	-3.8
N	ELECTRONIC ASSOC.	2- 3	1 7/8	+ 1/8	+7.1
A	ELECTRONIC ENGINEER.	8- 11	9 3/4	+ 1/4	+2.6
O	FOUR-PHASE SYSTEMS	13- 19	16 1/2	- 3/8	-2.2
N	FOXBORO	42- 54	43 3/8	-2 7/8	-6.7
O	GENERAL AUTOMATION	6- 9	6	- 3/8	-5.8
O	GRI COMPUTER CORP	1- 1	1/2	+ 1/8	+33.3
N	HEWLETT-PACKARD CO	69- 87	71 1/8	-3 5/8	-4.8
N	HONEYWELL INC	43- 55	42 7/8	-1 1/8	-2.5
N	IBM	245-286	256	+ 3/4	+0.2
O	MANAGEMENT ASSIST	5- 9	2	- 1/4	-3.4
O	MEMOREX	23- 34	26 1/2	-4 3/8	-14.1
O	MICRODATA CORP	7- 18	11 1/4	- 5/8	-5.2
O	MODULAR COMPUTER SYS	5- 8	6 1/8	- 3/8	-5.7
N	NCR	32- 47	38 3/4	-6 3/8	-14.1
O	PRIME COMPUTER INC	12- 23	19 7/8	+ 1/4	+1.2
N	PERKIN-ELMER	17- 22	19	- 1/8	-0.6
N	RAYTHEON CO	16- 33	29 1/2	- 1/4	-0.8
N	SPERRY RAND	30- 42	30	-1 7/8	-5.8
O	SYCOR INC	8- 15	11 1/2	- 1/8	-1.0
A	SYSTEMS ENG. LABS	5- 8	7 1/4	+ 3/8	+5.4
A	WANG LABS.	10- 14	12	0	0.0

LEASING COMPANIES

EXCH		1977 RANGE (1)	CLOSE OCT 19 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALANTHUS CORP	3- 5	4 1/2	- 1/8	-2.7
O	BOOTHE COURIER CORP	8- 10	9 3/4	- 1/4	-2.5
O	COMDISCO INC	10- 13	9 3/4	-2 1/4	-18.7
A	COMMERCE GROUP CORP	1- 3	7/8	- 3/8	-30.0
A	COMPUTER INVSTRS GRP	1- 2	1	+ 1/8	+14.2
M	DATRONIC RENTAL	0- 2	1 1/8	0	0.0
A	DCL INC	1- 2	2	0	0.0
N	DPF INC	6- 9	7 3/4	- 7/8	-10.1
N	ITEL	13- 22	16 7/8	-2	-10.5
N	LEASCO CORP	19- 27	21	-2 5/8	-11.1
O	LEASPAC CORP	1- 2	1	- 1/4	-20.0
O	NRG INC	1- 1	1/8	0	0.0
A	PIONEER TEX CORP	5- 11	5 3/8	0	0.0
N	U.S. LEASING	10- 15	11 7/8	- 5/8	-5.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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SOFTWARE & EDP SERVICES

EXCH		1977 RANGE (1)	CLOSE OCT 19 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1/2	- 1/8	-20.0
O	ANACOMP INC	7- 10	8 3/4	+ 1/8	+1.4
A	APPLIED DATA RES.	5- 10	8 1/4	+ 1/8	+1.5
N	AUTOMATIC DATA PROC	23- 30	24 5/8	- 7/8	-3.4
O	COLEMAN AMERICAN COS	2- 2	1 5/8	- 1/4	-13.3
O	COMPU-SERV NETWORK	9- 15	9 3/4	+ 1/4	+2.6
O	COMP ELECTION SYSTMS	6- 10	9 1/2	0	0.0
O	COMPUTER HORIZONS	1- 1	1 1/4	0	0.0
O	COMPUTER NETWORK	6- 11	9 1/2	- 1/4	-2.5
N	COMPUTER SCIENCES	7- 9	8 3/8	- 1/8	-1.4
O	COMPUTER TASK GROUP	1- 2	2	0	0.0
O	COMPUTER USAGE	1- 3	1 1/8	- 1/4	-18.1
O	COMSHARE	5- 8	6 1/2	- 1/2	-7.1
O	DATA DIMENSIONS INC	3- 5	3 1/8	0	0.0
O	DATATAB	1- 2	1 1/4	- 1/8	-9.0
N	ELECTRONIC DATA SYS.	14- 20	14 1/4	-1 1/8	-7.3
O	INSYTE CORP	2- 3	1 1/2	- 1/4	-14.2
O	IPS COMPUTER MARKET.	1- 2	1 5/8	0	0.0
O	KEANE ASSOCIATES	3- 4	4 3/8	- 1/8	-2.7
O	KEYDATA CORP	2- 3	1 5/8	- 1/8	-7.1
A	LOGICON	7- 17	12 1/8	+ 3/4	+6.5
A	MANAGEMENT DATA	1- 2	1 3/8	0	0.0
A	NATIONAL CSS INC	19- 27	24 5/8	- 1/8	-0.5
O	NATIONAL DATA CORP	4- 7	6 5/8	0	0.0
A	ON LINE SYSTEMS INC	16- 22	16	0	0.0
N	PLANNING RESEARCH	3- 6	4 1/2	- 3/8	-7.6
O	PROGRAMMING & SYS	1- 1	3/8	0	0.0
O	RAPIDATA INC	2- 3	2 1/2	+ 1/4	+11.1
O	REYNOLDS & REYNOLDS	17- 20	18	- 3/4	-4.0
O	SCIENTIFIC COMPUTERS	1- 4	3 3/4	- 1/4	-6.2
O	TYMSHARE INC	14- 23	18 5/8	- 1/2	-2.6
A	URS SYSTEMS	4- 5	4 3/8	- 1/4	-5.4
N	WYLY CORP	1- 2	3/4	-	-7.7

PERIPHERALS & SUBSYSTEMS

EXCH		1977 RANGE (1)	CLOSE OCT 19 1977	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 15	12 3/4	- 3/8	-2.8
O	ADVANCED MEMORY SYS	7- 9	6 7/8	+ 1/4	+3.7
N	AMPEX CORP	8- 11	9 5/8	+ 1/8	+1.3
O	ANDERSON JACOBSON	3- 5	3 3/4	- 1/4	-6.2
N	APPLIED DIG DATA SYS	10- 20	13 7/8	- 1/2	-3.4
O	BEEHIVE INTL	8- 12	8 1/8	-1 3/8	-14.4
A	BOLT,BERANEK & NEW	7- 9	7	-1 1/8	-13.8
N	BUNKER-RAMO	8- 12	10 1/2	+ 1/8	+1.2
A	CALCOMP	3- 5	3	- 3/8	-11.1
O	CAMBRIDGE MEMORIES	1- 4	3 1/4	-	-1.9
N	CENTRONICS DATA COMP	20- 30	23	-1 1/2	-6.9
O	COGNITRONICS	1- 1	3/4	0	0.0
O	COMPUTER COMMUN.	5- 8	6 1/8	- 5/8	-9.2
O	COMPUTER CONSOLES	4- 7	4	0	0.0
A	COMPUTER EQUIPMENT	2- 3	3	0	0.0
O	COMPUTER TRANSCEIVER	1- 1	1 1/4	- 1/8	-9.0
O	CONTEN	9- 13	10 1/2	- 1/4	-2.3
N	CONRAC CORP	19- 28	21 1/4	+1	+4.9
O	DATA ACCESS SYSTEMS	4- 5	3 1/2	- 1/4	-6.6
O	DATA 100	6- 9	7 3/8	- 1/8	-1.6
A	DATA PRODUCTS CORP	9- 17	14 1/2	- 7/8	-5.6
O	DATA TECHNOLOGY	3- 4	4 1/4	0	0.0
O	DATUM INC	1- 2	1 3/4	0	0.0
O	DECISION DATA COMPUT	2- 3	2	0	0.0
O	DELTA DATA SYSTEMS	1- 1	3/8	0	0.0
A	DOCUMATION INC	6- 9	7 1/4	- 1/4	-3.3
O	DATARAM CORP	2- 12	10 1/2	-1 1/4	-10.6
N	ELECTRONIC M & M	4- 8	3 7/8	0	0.0
O	FABRI-TEK	1- 2	1 1/8	-	-4.9
O	GENERAL COMPUTER SYS	0- 2	1	0	0.0
N	HAZELTINE CORP	8- 12	8 1/8	- 1/4	-2.9
N	HARRIS CORP	28- 39	37 7/8	- 5/8	-1.6
A	INCOTERM CORP	10- 16	16	+ 1/4	+1.5
O	INFOREX INC	4- 7	4 1/2	- 1/8	-2.7
O	INFORMATION INTL INC	9- 14	10 1/2	- 1/2	-4.5
O	INTEL CORP	38- 57	42 1/2	-2 1/2	-5.5
A	LUNDY ELECTRONICS	3- 6	4 1/2	- 3/8	-7.6
O	MSI DATA CORP	6- 13	12 1/4	0	0.0
N	MOHAWK DATA SCI	5- 8	5 3/4	- 1/8	-2.1
O	PENRIL CORP	2- 5	3 7/8	0	0.0
A	PERTEC CORP	7- 9	8 5/8	0	0.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	2- 2	1 1/2	0	0.0
O	QUANTOR CORP	4- 5	3 5/8	0	0.0
O	RECOGNITION EQUIP	6- 10	7 1/2	+ 1/8	+1.6
O	SCAN DATA	1- 2	1	0	0.0
O	STORAGE TECHNOLOGY	10- 18	15 3/8	- 1/2	-3.1
O	T BAR INC	7- 13	12 1/8	- 3/8	-3.0
O	TALLY CORP.	4- 6	3 5/8	- 1/8	-3.3
A	TEC INC	7- 10	7 1/4	- 3/8	-4.9
N	TEKTRONIX INC	29- 38	35 1/4	-2	-5.3
N	TELEX	2- 3	2 1/4	- 1/8	-5.2
O	WILTEK INC	1- 1	3/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1977 RANGE (1)	CLOSE OCT 19 1977	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 8	6 1/8	0	0.0
O	BALTIMORE BUS FORMS	1- 4	1 1/4	- 1/8	-9.0
A	BARRY WRIGHT	10- 14	12 1/4	- 1/4	-2.0
O	CYBERNETICS INC	1- 1	7/8	0	0.0
O	DUPLEX PRODUCTS INC	14- 19	17	- 1/2	-2.8
N	ENNIS BUS. FORMS	6- 7	5 7/8	0	0.0
O	GRAHAM MAGNETICS	11- 17	16 7/8	- 1/8	-0.7
O	GRAPHIC CONTROLS	13- 18	12 3/4	0	0.0
N	3M COMPANY	48- 56	48	-1 3/4	-3.5
O	MOORE CORP LTD	26- 37	25 5/8	- 1/4	-0.9
N	NASHUA CORP	16- 28	19	- 1/2	-2.5
O	STANDARD REGISTER	18- 25	20 1/2	- 1/4	-1.2
O	TAB PRODUCTS CO	10- 19	10	- 1/4	-2.4
N	UARCO	19- 22	18 1/2	0	0.0
A	WABASH MAGNETICS	10- 15	10 7/8	-1 3/8	-11.2
N	WALLACE BUS FORMS	17- 21	18 5/8	+ 3/8	+2.0

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